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ABSTRACT

The Nevada Science Standards represent a common core for curriculum throughout Nevada's schools. The Nevada Science Standards are intended to provide Nevada students with a rich, thorough, and varied science education to prepare them for the challenges, discoveries, and demands of life in the 21st century. The two main sections of the document provide content standards for grades 2, 3, 5, 8, and 12, indicators of progress for grades K, 1, 4, 6, and 7, and Performance Level Descriptors. (MM)

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ED 466 404

Nevada Science

Content Standards for Grades 2, 3, 5, 8 and 12

and

Indicators of Progress for Kindergarten and Grades 1, 4, 6 and 7

[and] Performance Level Descriptors

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Table of Contents

Content Area **Page(s)**

Introduction 3 - 5

Content Standards and Indicators of Progress, Kindergarten through Grade 4 6 - 41

Content Standards and Indicators of Progress, Grades 5 through 12 42 - 107

Glossary 108 - 110

Nevada Science Standards

Introduction

Science is the component of the school curriculum in which student inquiry and discovery can develop and flourish. Science seeks to make sense of the natural world by describing its complexity, explaining its systems and events, and finding patterns that allow for predictions. It is the basis for the design of technologies that solve real-world problems and occupies an increasingly important place in our everyday lives. As citizens, we are asked to make decisions about social issues that involve science and technology. As workers, we have occupations that increasingly involve science and technology. In the twenty-first century, adults will need to be comfortable and competent in a complex scientific and technological world. Schools have the responsibility of preparing students for the future. Schools must prepare all students to be scientifically literate.

The study of science involves exploration using a variety of technologies. Current technology tools for communication, research, problem solving, and decision making provide students with opportunities to apply scientific concepts in project-based activities. Use of video, the Internet, and other print and non-print sources enhances students' learning experiences and helps make those experiences meaningful.

The *Nevada Science Standards* represent a common core for curriculum throughout Nevada's schools. Many people may recognize, however, that as in many human endeavors the process is at least as important as the product. These content standards are the result of an invaluable process of dialogue and consensus-building among educators, scientists, industry representatives, and parents from throughout Nevada about what all students should know and be able to do in science. The content standards are essential to accomplishing the goals for science education listed below.

Goals of Science Education in Nevada

All graduates of Nevada schools should:

- Demonstrate the processes of science by posing questions and investigating phenomena through language, methods, and instruments of science;
- Acquire scientific knowledge by applying concepts, theories, principles, and laws from life, physical, and Earth/space science;
- Demonstrate ways of thinking and acting inherent in the practice of science and exhibit an awareness of the historical and cultural contribution to the enterprise of science; and
- Demonstrate an ability to solve problems and make personal decisions about issues affecting the individual, society, and the environment.

Content Organization

All of the sciences connect with each other. However, it has been necessary, for ease of use, to divide this document into an ordered hierarchy. This organizational scheme should in no way be interpreted as a mandate for structuring academic courses or curriculum.

The complete domain of what students should know and be able to do is organized in this document as six strands: physical science; life science; earth and space sciences; environmental sciences; the nature and history of science; and scientific inquiry: processes and skills. Each of the six strands is further divided into content standards which constitute the "big ideas" of science. For example, Physical Science is divided into five content standards, beginning with Forces and Motion. Specific grade-level benchmarks further define student expectations relative to this content standard. These benchmarks are specific enough to provide a common content core for local curriculum but broad enough to allow school districts many diverse curricular paths to meet the standards. The order in which concepts are listed from top to bottom on any given page is not meant to imply an order in which concepts should be taught. Curriculum designers and teachers are encouraged to build units of study that address standards from multiple strands, to emphasize interdisciplinary study.

Knowledge and processes are both important in the area of science. It is even more important that students be able to combine their scientific knowledge and the processes of science to develop their own understanding of science. For example, students should be encouraged to engage in such activities as asking questions, planning and conducting their own investigations, and using tools and technology to gather data. Therefore, the *Nevada Science Standards* frequently use verb combinations to describe what a student is expected to know and be able to do. For example, at the third grade, students are expected to "investigate and describe the ways that different objects may balance or topple in various situations." The *Nevada Science Standards* are intended to provide Nevada students with a rich, thorough, and varied science education to prepare them for the challenges, discoveries, and demands of life in the twenty-first century.

This edition of the Nevada Science Standards contains supplemental information not previously included in previous editions. First, suggested interdisciplinary links have been noted at the bottom of each box, when applicable, for grades 2, 3, 5, 8 and 12. Second, for the Benchmark Grades of 2, 3, 5, 8 and 12, each of the benchmark standards were prioritized based on a three-part framework which included Enduring Knowledge, Important Knowledge and Knowledge Worth Being Familiar With. In addition, for each of the benchmark standards in grades 5, 8, and 12, a determination was made as to whether the standard would be assessed locally by school district personnel or through a state assessment. In doing so, it was assumed that all standards would be assessed at the local level but that only some of the standards are appropriate for assessment at the state level. Listed below are the keys to the coding used throughout the document regarding interdisciplinary links by subject area, prioritization framework and assessment level.

KEY TO INTERDISCIPLINARY LINKS

(Located at the bottom of each box, as applicable, for Grades 2, 3, 5, 8, and 12)

C = Civics
E = English Language Arts
Ec = Economics
G = Geography
H = History
M = Mathematics
S = Science

KEY TO PRIORITY FRAMEWORK AND ASSESSMENT LEVEL

E = Enduring. Complex, engaging, "big ideas," will require more in-depth knowledge.
I = Important to know and do. Students should retain detailed but not extensive knowledge.
W = Worth being familiar with. Students should have awareness of key people, ideas, concepts, and terms.

L = Nevada Academic Standards that are assessable at the local level ONLY.
S = Nevada Academic Standards that are assessable at the state and local levels.

The coding for both the priority framework and the assessment level are located at the top, right hand corner of each box. Priority framework coding is provided for Grades 2, 3, 5, 8, and 12. Assessment level coding is provided for Grades 5, 8, and 12 only. As an example, the letters E/L found at the top right hand corner of a 5th grade benchmark standard would indicate that the standard requires Enduring knowledge and will only be assessed at the local level.

Physical Science

Content Standard 1.0: Forces and Motion—*Students understand that forces such as gravitational, electrical, and magnetic influence the motion of objects.*

By the end of **Kindergarten**, students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
1.K.1 Investigate and describe how objects move.		I 1.2.1 Observe and describe objects moving at different speeds.	I 1.3.1 Apply unbalanced **forces**[1] (a push or pull) to cause objects to change their motion (e.g., speed, direction or both).		Description of Motion
			I 1.3.2 Investigate and describe the ways that different objects may balance or topple in various situations.	1.4.2 Investigate and describe balance points of different objects.	Gravity
		I 1.2.3 Assemble, take apart, and reassemble constructions using interlocking blocks, erector sets, and the like.	I 1.3.3 Manipulate hammers and nails, screwdrivers and screws, scissors, and other simple tools.		Machines

Force – Any push or a pull

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[1] Words in bold text are defined at the bottom of each page.

Content Standard 1.0: Forces and Motion

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
K.4. 1 Observe and describe how objects behave when placed in water.				1.4.4 Investigate and describe how objects can sink or float in water.	Pressure, Density, and Buoyancy
	1.1.5 Observe and describe how magnets can be used to make objects move without being touched.				Electrical and Magnetic Forces

Physical Science

Content Standard 2.0: Structure and Properties of Matter—*Students understand that materials have distinct properties which depend on the amount of matter present, its chemical composition, and structure.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		E 2.2.1 Describe objects in terms of their observable **properties**[2] (e.g., state of matter, size, shape, color, texture). M 3.2.1; M 3.2.2; M 4.2.1	E 2.3.1 Describe objects in terms of their observable properties (e.g., state of matter, size, shape, color, texture). M 4.3.1; M 4.3.4	2.4.1 Investigate and describe properties of materials when they are combined (mixtures).	Physical Properties
			E 2.3.2 Sort and classify objects according to observable properties (e.g., size, weight, shape, color). M 4.3.4		Chemical Analysis
		W 2.2.3 Put small objects together to form bigger objects.			Chemical Bonding
					Atomic Theory

Properties – Characteristics unique to a set of particular living or non-living things. (see 6.2).

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[2] This topic is taught in subsequent grades.

Content Standard 2.0: Structure and Properties of Matter

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
				2.4.5 Observe and describe that different objects and materials may be composed of parts that are too small to be seen without magnification.	System of Particles
					Properties and Composition

Physical Science

Content Standard 3.0: Energy and Matter: Interactions and Forms—*Students understand that changes in temperature and pressure can alter states of matter. Energy exists in many forms, and one form can change into another.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		W 3.2.1 Describe an object as hot or cold.	I 3.3.1 Describe how hot or cold an object is by expressing its temperature. M 3.3.3		Heat and Temperature
	3.1.2 Observe and describe materials in different states (i.e. solids and liquids).	W 3.2.2 Investigate and describe how objects can change state (e.g., melting ice cube).	W 3.3.2 Investigate and describe how solid ice can melt and liquid water will disappear if allowed to stand in an open container.		Changes of State
		I 3.2.3 Investigate and describe how sound can be produced by vibrating objects and how it has different properties (e.g., high-low, soft-loud).			Waves

Content Standard 3.0: Energy and Matter: Interactions and Forms

By the end of **Kindergarten**, students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
				3.4.4 Investigate and describe how **circuits** can produce light, heat, sound, and magnetic effects.	Circuits
					Changes in Energy
					Descriptions of Energy and Order

Circuit – (electrical circuit) – an assembly of electrical parts.

Physical Science

Content Standard 4.0: Chemical Reaction—*Students understand that chemical reactions change substances into different substances.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Conservation of Matter
					Rates of Chemical Reactions
					Transformation of Matter and Energy
					Chemical Properties

Physical Science

Content Standard 5.0: Nuclear and Electromagnetic Energy—*Students understand that nuclear energy and electromagnetic energy are produced from both natural and human-made sources in many forms.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Behaviors of Light
					Nuclear Applications
					Nuclear Wastes
					Electromagnetic Energy
					Nuclear Structures and Processes
					Nuclear Energy

Life Science

Content Standard 6.0: Structure and Function—*Students understand that all life forms, at all levels of organization, use specialized structures and similar processes to meet life's needs.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2,** students know and are able to do everything required in earlier grades and:	By the end of **Grade 3,** students know and are able to do everything required in earlier grades and:	By the end of **Grade 4,** students know and are able to do everything required in earlier grades and:	
6.K.1 Observe and describe animal attributes.	6.1.1 Observe and describe plant attributes.	E 6.2.1 Investigate and describe how living things grow and change.	E 6.3.1 Investigate and describe how plants and animals have life cycles and require food, water, air, and space.		Life Cycles and Disruptions
6.K.2 Compare and contrast how humans and animals use their senses.	6.1.2 Use the five senses to investigate the natural world.	W 6.2.2 Distinguish living from non-living things using established criteria.	I 6.3.2 Investigate, compare, and contrast identifiable characteristics of plants and animals.	6.4.2 Investigate, compare, and contrast identifiable structures of plants and animals.	Structures, Functions, and Systems
			I 6.3.3 Investigate and describe how plants and animals require certain conditions to survive.		Environment, Energy, and Cellular Functions
					Control of Cellular Functions

Life Science

Content Standard 7.0: Internal and External Influences on Organisms—*Students understand that organisms respond to internal and external influences.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1,** students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2,** students know and are able to do everything required in earlier grades and:	By the end of **Grade 3,** students know and are able to do everything required in earlier grades and:	By the end of **Grade 4,** students know and are able to do everything required in earlier grades and:	
			W 7.3.1 Investigate and describe how various living things behave differently under diverse conditions.	7.4.1 Investigate and describe the behavior of individual organisms when influenced by internal cues (e.g. hunger) and by external cues (e.g. environment).	Influences on Behavioral Patterns
					Origins of Behavioral Patterns
					Stimulus and Behavior
		W 7.2.4 Explain that some diseases are caused by **germs** and some are not; diseases caused by germs may be spread by people who have them.	I 7.3.4 Explain that if germs are able to get inside one's body, they may keep it from working properly.		Disease

Germs – A microscopic disease-causing organism.

Life Science

Content Standard 8.0: Heredity and Diversity—*Students understand that life forms are diverse, and that they pass some characteristics to their offspring.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
8.K.1 Observe and describe how animals have offspring that are the same kind of animal.	8.1.1 Investigate and describe how particular plants have seeds that produce the same kind of plant.	E 8.2.1 Investigate and describe how particular animals have offspring that are the same kind of animal.	E 8.3.1 Investigate and describe how offspring may resemble parents and siblings may resemble each other.		Inherited Traits
8.K.2 Sort animals by observable characteristics.	8.1.2 Sort plants by observable characteristics.	W 8.2.2 Investigate and describe how some living things look alike and others do not.	W 8.3.2 Investigate and describe how some living things are alike in their appearance and behaviors; others are not.		Variation and Classification of Organisms
				8.4.3 Observe and describe variations among individuals within the human population.	Variation

Content Standard 8.0: Heredity and Diversity

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Diversity of Species
					Mutations

Life Science

Content Standard 9.0: Evolution – The Process of Biological Change—*Students understand that life forms change over time.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
			W 9.3.1 Explain that many different kinds of living things exist on Earth.		Common Ancestry
			I 9.3.2 Explain how particular features of plants and animals help them live in different kinds of places.		Natural Selection
					Adaptation
					Evidence for the Theory of Evolution

Content Standard 9.0: Evolution

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Influences on Evolution
					Life Origins

Earth and Space Sciences

Content Standard 10.0: Earth Structures and Composition—*Students understand that the Earth is composed of interrelated systems of rocks, water, air, and life.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		I 10.2.1 Describe that rocks come in many sizes and shapes and have interesting textures, colors, and patterns.	I 10.3.1 Investigate and describe how the Earth is composed of different kinds of materials (e.g., rocks and soils, water, and the atmosphere).	10.4.1 Investigate, compare, and contrast the properties of rocks and minerals.	Rocks and Minerals
			W 10.3.2 Describe how the Earth is composed of different **landforms**. G 2.2.1	10.4.2 Compare and contrast the location of landforms.	Landforms
			W 10.3.3 Investigate and describe how the Earth is nearly spherical and covered with more water than land. G 1.2.7		Earth's Structure and Composition

Landform – A large feature on the surface of the Earth, including mountains, volcanoes, canyons, etc.

Content Standard 10.0: Earth Structures and Composition

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
				10.4.4 Investigate and describe the composition of different soils.	Soil
					Earth's Atmosphere
					Geologic Processes and Features

Earth and Space Sciences

Content Standard 11.0: Earth Models—*Students understand that the Earth may be represented by a variety of maps and models.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
			W 11.3.1 Describe that directions on the Earth can be represented by north, south, east, and west. G 1.3.1		Locating Positions on the Earth
			W 11.3.2 Locate the state of Nevada on a national map and their own city on a Nevada state map. G 1.2.8; G 7.3.2		Nevada and the Earth
					Models of the Earth
					Time and Location on the Earth

Earth and Space Sciences

Content Standard 12.0: Earth History—*Students understand that Earth systems (such as weather and mountain formation) change or vary.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		I 12.2.1 Investigate and describe how changes happen to many things (e.g., weather). G 2.2.5; G 3.2.1; G 3.12.2; G 5.12.1	W 12.3.1 Investigate and describe how some changes are so slow (e.g., seasons) or so fast (e.g., lightening strikes) that they are hard to see.		Change Over Time
					Relative Geologic Time and the Fossil Record
					Geologic Time
					Age of the Earth and Solar System

46

47

Earth and Space Sciences

Content Standard 13.0: Cycles of Matter and Energy—*Students understand that Earth systems have a variety of cycles through which energy and matter continually flow.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		W 13.2.1 Investigate and describe how the sun warms the land, air, and water.	W 13.3.1 Investigate and describe how things that give off light also often give off heat.		Earth Energy Sources
13.K.2 Observe and record weather from day to day.	13.1.2 Observe and record seasonal changes.	I 13.2.2 Investigate and describe how weather changes from day to day and throughout the year.	W 13.3.2 Observe, record, and describe seasonal differences using words, numbers, and drawings. E 11.3.4; M 7.3.7	13.4.2 Identify and describe various meteorological phenomena (e.g. floods, drought)	Weather
			E 13.3.3 Investigate and describe how water can be a liquid or a solid and can go back and forth from one form to the other.	13.4.3 Investigate and describe the forms and uses of water.	Water

Content Standard 13.0: Cycles of Matter and Energy

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Climate
					The Nature of Change
					Bio-Geochemical Cycles
				13.4.7 Identify the components of our solar system (i.e. planets, moon, asteroids, comets, sun)	Energy Transfer and Transformation in the Earth System
					Earth's Internal Energy

Earth and Space Sciences

Content Standard 14.0: The Solar System and the Universe—*Students understand that the Earth is part of a planetary system within the Milky Way Galaxy, which is part of the known universe.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		W 14.2.1 Observe and describe the sun, moon, planets, and stars.	W 14.3.1 Identify the sun, moon, and the Earth as components of our solar system.	14.4.1 Observe and describe properties, locations, and movements of the sun, moon, stars, clouds, birds, and planes.	The Solar System
		W 14.2.2 Describe the movement of some of the objects in the sky.		14.4.2 Observe and describe the changes of the moon's appearance over time.	Celestial Motion
			W 14.3.3 Explain that there are more stars in the sky than anyone can easily count.	14.4.3 Investigate and describe how distance affects the brightness of any light source.	Stars and Galaxies

Content Standard 14.0: The Solar System and the Universe

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Origin of the Universe
					Tools and Methods of Astronomy
					Universality of Physical Laws

Environmental Sciences

Content Standard 15.0: Ecosystems—*Students will demonstrate an understanding that ecosystems display patterns of organization, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
15.K.1 Recognize that animals live in different places.	15.1.1 Recognize that plants grow in different places.	E 15.2.1 Investigate and describe the roles of plants as producers and animals as consumers and how living things may depend on each other. G 3.2.2	I 15.3.1 Investigate and describe how animals and plants that live in different places have similarities and differences. G 3.3.1		Stability and Change in Ecosystems
		I 15.2.2 Investigate and describe how animals eat plants or other animals for food and may also use plants or even other animals (for shelter and nesting).	E 15.3.2 Investigate and describe the interactions of organisms within an **ecosystem**.	15.4.2 Investigate and describe the variables that affect the survival of organisms within an ecosystem.	Relationships and Interactions in Ecosystems
					Cycles of Matter and Energy in Ecosystems
					Characteristics of Ecosystems

Ecosystem – A system of relationships between organisms in an environment, and between organisms and the environment.

Environmental Sciences

Content Standard 16.0: Natural Resources—*Students demonstrate and understand that natural resources include renewable and non-renewable materials and energy. All organisms, including human, use resources to maintain and improve their existence, and the use of resources can have positive and negative consequences.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		W 16.2.1 Investigate and describe how some resources can be used and reused.	W 16.3. Explain that natural resources are used for many purposes. G 5.3.6; G 5.3.7	16.4.1 Identify the natural resources of Nevada.	Renewable and Nonrenewable Resources
		W 16.2.2 Describe the various resources that provide the necessary things that are used by people in their daily lives. G 4.2.6	W 16.3.2 Describe how humans have obtained natural resources for thousands of years through farming, mining, and hunting and gathering. G 5.3.6; G 5.3.7	16.4.2 Investigate and describe resources which can be used and reused or renewed.	Acquisition and Use of Natural Resources
—					Traditional and Innovative Uses of Natural Resources

Content Standard 16.0: Natural Resources

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Environmental Consequences of Natural Resource Use
					Technology and Human Population

Environmental Sciences

Content Standard 17.0: Conservation—*Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole and future generations.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		W 17.2.1 Describe how people live in different places in different ways. G 2.2.2; G 4.2.4; G 5.2.4	W 17.3.1 Explain that many materials can be recycled and used again, sometimes in different forms. G 5.3.7		Conservation
		W 17.2.2 Describe how some things in students' daily lives change and other things stay the same.	I 17.3.2 Investigate and describe how patterns of change may be observable and predictable. G 2.3.6	17.4.2 Observe, investigate, and describe how some environmental changes occur quickly and some occur slowly.	Systems and Equilibrium
					The Scientific Nature of Environmental Issues
					Responsible Behavior

The Nature and History of Science

Content Standard 18.0: Scientific, Historical, and Technological Perspectives—*Students understand that science is a unique way of knowing about things. Many men and women have contributed to the traditions of science. The ability to pursue activities and careers in science is accessible to people from all cultures and all levels of ability.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		W 18.2.1 Explain that everybody can invent things and ideas.	E 18.3.1 Explain that science is a process that involves observing and asking questions about the natural world and seeking answers to those questions.		The Nature of Science
			I 18.3.2 Explain that accurate descriptions in science are important because they enable people to compare their observations with those of others.	18.4.2 Identify the components of scientific investigation (e.g. observing, collecting data, classifying)	Attributes of Scientific Research
			I 18.3.3 Recognize that science engages men and women of all ages and backgrounds. H 3.8.2; H 3.8.4; H 4.8.2; H 5.8.1		The History of Science and Invention

Content Standard 18.0: Scientific, Historical, and Technological Perspectives

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
			W 18.3.4 Give examples of the benefits of working with a team and sharing findings.	18.4.4 Exchange scientific observations and ideas.	Science as a Collaborative Process
			I 18.3.5 Explain that tools are used to do things better or more easily (e.g. observe, measure, and make things) and to do some things that could not be done at all (e.g. see things that are too small to be seen unaided. Ec 7.2.1	18.4.5 Explain that measuring instruments can be used to gather information for making scientific comparisons of objects and events for designing and constructing things that will work properly.	Technology
					The Dynamic Character of Scientific Knowledge
					Scientific Ethics

The Nature and History of Science

Content Standard 19.0: Reasoning and Critical Response Skills—*Students understand that many decisions require critical consideration of scientific evidence*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Evaluating Data
					Analyzing and Evaluating Benefits and Risks
					Analyzing Systems
					Critical Analysis
					Critical Evaluation

The Nature and History of Science

Content Standard 20.0: Systems, Models, Risk, and Predictions--*Students understand that a variety of models can be used to describe or predict things and events.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
	20.1.1 Use toy models (e.g. miniature cars, toy animals) to explain the things they represent.		W 20.3.1 Compare a **model** with what it represents (e.g., a model of the Earth to the Earth itself). G 7.3.5		Models
			E 20.3.2 Identify observable patterns and predict future events based on those patterns (e.g. seasonal weather patterns.) M 2.3.1		Models and Predictions
		W 20.2.3 Explain that something may not work if some of its parts are missing.	I 20.3.3 Demonstrate that when parts are put together, they can do things together they couldn't have done by themselves.		Systems
					Statistical Modeling
					Risk Analysis

Model – A physical, graphical, or mathematical representation of a thing or event.

Scientific Inquiry: Processes and Skills

Content Standard 21.0: Scientific Values and Attitudes—*Students understand that science is an active process of systematically examining the natural world.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
21.K.1 Ask questions about the world.	21.1.1 Make observations and give descriptions.	I 21.2.1 Make observations and give descriptions using words, numbers, and drawings. M 7.2.7; M 7.2.18	E 21.3.1 Observe and raise questions about the world, then seek answers through investigation. E 10.3.2	21.4.1 Conduct fair tests to make observations.	Scientific Investigations
		I 21.2.2 Record observations of investigations over time in a notebook or journal. (e.g., growth of a plant, changes in weather) G 4.2.1; M 7.2.7	I 21.3.2 Record observations of investigations over time in a notebook or journal. (e.g., changes in an aquarium or terrarium) M 7.3.7		Repeating Scientific Trials
					Generating Multiple Explanations

Scientific Inquiry: Processes and Skills

Content Standard 22.0: Communication Skills—*Students understand that a variety of communication methods can be used to share scientific information.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		W 22.2.1 Follow verbal instructions accurately. E 8.2.4	W 22.3.1 Follow verbal and written instructions to complete a procedure. E 4.3.6; E 8.3.4		Writing and Following Instructions
	22.1.2 Draw pictures that describe observations.	I 22.2.2 Produce simple pictographs to describe observations. G 7.2.3; E 11.2.5; M 7.2.4; M 7.2.7	I 22.3.2 Create illustrations, graphs, and charts to convey ideas and record observations. G 4.3.1; G 7.3.3; E 11.3.5		Working With Graphical Models
22.K.3 Share information and ideas with others.	22.1.3 Respect ideas and contributions of others.	I 22.2.3 Cooperate and contribute ideas within a group. E 10.2.3	I 22.3.3 Cooperate and contribute ideas within a group. E 10.3.1; E 10.3.3		Working With Others

Scientific Inquiry: Processes and Skills

Standard 23.0: Scientific Applications of Mathematics—*Students understand that scientific inquiry is enhanced and often communicated by using mathematics.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Variables
					Computing
		W 23.2.3 Give rough estimates of numerical answers to problems before calculating. M 1.12.1	W 23.3.3 Give rough estimates of numerical answers to problems before calculating.		Estimating

Standard 23.0: Scientific Applications of Mathematics

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Working With Measurements
	23.1.5 Make predictions based on observed patterns.	E 23.2.5 Recognize unexpected or unusual results in activities. M 6.2.4	I 23.3.5 Determine whether measurements and descriptions are reasonably accurate. M 6.3.4		Evaluating Measurements
					Analyzing Data and Solving Problems
					Validity of Samples

Scientific Inquiry: Processes and Skills

Content Standard 24.0 Laboratory Skills and Safety—*Students can appropriately and safely apply the tools and techniques of scientific inquiry.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
			E 24.3.1 Use equipment properly and safely in all science activities.		Working Safely
					Working With Chemicals
			I 24.3.3 Identify and gather tools and materials needed in an investigation.		Using Experimental Apparatus

Content Standard 24.0 Laboratory Skills and Safety

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
	24.1.4 Record observations.	I 24.2.4 Keep a record of observations and measurements taken over time. M 7.2.7	I 24.3.4 Keep a record of observations and measurements taken over time. E 11.3.4; M 7.3.7		Recording Data
					Writing and Following Laboratory Procedures
					Designing and Conducting Experiments

Physical Science

Content Standard 1.0: **Forces and Motion**—*Students understand that forces such as gravitational, electrical, and magnetic influence the motion of objects.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/L 1.5.1 Investigate and describe the relationship that exists between the size of a change in motion of an object to the size of a push or pull on that object. M 7.5.2; M 7.5.8; M 8.5.2; M 9.5.6; M 9.5.3	1.6.1 Investigate and describe the concept that some objects move so slowly or so rapidly that their motion is difficult to detect.	1.7.1 Investigate and describe the effect of retarding forces such as friction on the motion of objects.	I/S 1.8.1 Investigate and describe that multiple forces acting on an object along a straight line affect the motion of an object. M 7.8.2; M 9.8.3	E/S 1.12.1 Investigate and describe how changes in motion are based on the **laws of motion**[3].	Description of Motion
I/L 1.5.2 Investigate and describe that objects usually move downward when they fall or are released in the air or on ramps.		1.7.2 Investigate and describe the gravitational relationship that exists between the masses of objects and how far apart they are.	E/S 1.8.2 Describe the force (**gravity**) which makes objects fall and planets move in their orbits.	I/L 1.12.2 Explain that the **force of attraction** that exists between two masses is inversely proportional to the square of the distance between them. M 2.12.3; M 2.12.5; M 6.8.1 M 9.12.3; M 9.12.6; M 1.12.2; M 7.12.9; 6.12.1; 6.12.4	Gravity

Law –A statement about a natural event or series of events that is always true under certain conditions; can be used to make reliable predictions about nature.
Laws of Motion –A set of laws that describe relationships among force and motion;
Gravity – The attractive force between any two objects;
Force of Attraction – A pull between two objects (i.e., gravity and electrostatic attraction).

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[3] Words in bold text are defined at the bottom of each page.

Content Standard 1.0: Forces and Motion

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
W/L 1.5.3 Investigate and describe that objects may move in a variety of ways (e.g., straight lines or by rotating, rolling, or revolving).	1.6.3 Investigate and describe how machines can use motion to do work.		I/S 1.8.3 Investigate and describe that certain physical principles are used in the design and function of simple machines.	I/L 1.12.3 Investigate and describe that the usefulness of a simple machine such as a wheel or axle is based on its function, **mechanical advantage,** and **efficiency.**	Machines
W/L 1.5.4 Classify objects by whether they sink or float in air or water.	1.6.4 Investigate and describe the relationship between the mass and the volume of various objects.	1.7.4 Investigate and describe the **density** of solids, liquids, and gases.	I/S 1.8.4 Investigate and describe that buoyancy changes the apparent weight of an object immersed in a fluid. M 2.8.2; M 9.8.3	I/L 1.12.4 Investigate and describe the relationship that exists between force, **pressure,** and area in general, and between pressure and depth in liquids. M 7.12.2; M 9.12.3; M 9.12.6; M 2.12.3; M 6.12.1; M 6.12.4; M 7.12.9	Pressure, Density, and Buoyancy

Mechanical Advantage – The degree to which a machine makes work easier by decreasing either the force or distance needed to move something.
Efficiency- Determines how close a machine is to operating without the loss of energy due to friction.
Density –The relationship that exists between mass and volume of an object. A cube of styrofoam has less density than an equal–size cube of rock.
Pressure – Force per unit of area.

Content Standard 1.0: Forces and Motion

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/L 1.5.5 Investigate and describe the ways that magnets attract and repel each other and certain kinds of other materials.			I/S 1.8.5 Investigate and explain that electric current produces magnetic forces, and moving magnets produce electric forces in **conductors**.	W/L 1.12.5 Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single **electromagnetic force**. (e.g., electric motors, generators, radios).	Electrical and Magnetic Forces

Conductor – A material that carries a force such as metal carries heat or electricity.
Electromagnetic Force – The unified force of electricity and magnetism.

Physical Science

Content Standard 2.0: **Structure and Properties of Matter**—*Students understand that materials have distinct properties which depend on the amount of matter present, its chemical composition, and structure.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/S 2.5.1 Separate mixtures based on their properties.		2.7.1 Investigate and describe the differences between **homogeneous and heterogeneous mixtures**.	E/S 2.8.1 Use simple models to explain observed properties of matter (e.g., use a particle model to account for the states of matter).	E/S 2.12.1 Investigate and describe **intrinsic** (color, odor, density) and **extrinsic** (e.g., size, mass, volume) physical properties of matter. M 3.12.2; M 3.12.5; M 6.12.1; M 9.12.7	Physical Properties
I/L 2.5.2 Describe and classify matter in terms of elements, compounds, and mixtures.			E/S 2.8.2 Separate **substances** based on their physical and chemical properties (e.g., color, solubility, **chemical reactivity,** melting point, boiling point).	W/L 2.12.2 Explain that substances can be identified on the basis of specific energies given off or taken in by that substance.	Chemical Analysis

Homogeneous Mixtures – A mixture in which all of the components are evenly distributed, with no visible distinct parts; examples include salt water and air.
Heterogeneous Mixtures – A mixture in which the components are unevenly distributed, and may be seen to separate into two or more distinct parts; examples include salad dressing, sand and iron filings, and smoke in air.
Intrinsic Property – A characteristic of a sample of material related only to the quality of the material itself and not on the amount of material present; examples include density, color, odor, and hardness.
Extrinsic Property – A property of material that depends on the amount of material present, for example, mass, length, and volume.
Substance – The class of homogeneous matter made up of elements and compounds.
Chemical Reactivity – Indicates how likely a substance is to undergo change to a new substance.

Content Standard 2.0: **Structure and Properties of Matter**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
W/L 2.5.3 Investigate and describe the ways that solids remaining after a solvent has been evaporated may form distinctive patterns of crystals.			I/S 2.8.3 Use models or drawings to explain how atoms may join together to form molecules or large groups of molecules.	I/S 2.12.3 Explain how atoms may bond with one another by transferring or sharing electrons that are farthest from the nucleus.	Chemical Bonding
	2.6.4 Explain that all **matter** is composed of atoms, and atoms are composed of smaller particles.	2.7.4 Describe atomic structure by using various historic models of the atom.	E/S 2.8.4 Explain that all atoms are made up of protons, neutrons, and electrons.	W/L 2.12.4 Explain that the electromagnetic force between the nucleus and electrons holds the atom together.	Atomic Theory

Matter – Anything that has mass and takes up space.

Content Standard 2.0: **Structure and Properties of Matter**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/S 2.5.5 Investigate and describe how materials can be broken down physically into smaller and smaller pieces, and that each piece may retain its same properties.			I/S 2.8.5 Explain that liquids, solids, and gases are systems of particles.	I/S 2.12.5 Explain the properties of phases of matter in terms of the **kinetic molecular theory** and forces of attraction between particles.	System of Particles

Kinetic Molecular Theory – A theory stating that all material is made of tiny particles that are in constant motion; this provides a model that is useful for describing why states of matter have their particular properties and behaviors.

Theory – An explanation or model based on observation, experimentation, and reasoning; especially one that has been tested and confirmed as a general principle helping to explain and predict natural events.

Content Standard 2.0: **Structure and Properties of Matter**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/L 2.5.6 Investigate and describe how the observable properties of a material depend on its composition.	2.6.6 Investigate and describe how elements can combine to form new substances which often have different properties.		E/S 2.8.6 Explain that various elements combine in a multitude of ways to produce all known living and non-living substances.	I/L 2.12.6 Explain that carbon atoms can bond to one another to form a large variety of structures, including the molecules essential to life.	Properties and Composition

Physical Science

Content Standard 3.0: **Energy and Matter: Interactions and Forms**—*Students understand that changes in temperature and pressure can alter states of matter. Energy exists in many forms, and one form can change into another.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/L 3.5.1 Investigate and describe how warm objects cool and cool objects warm when they are put together, until they reach the same temperature.			E/L 3.8.1 Investigate and describe how heat moves from one object to another at different rates, depending on what the objects are made of and whether they are touching each other.	E/S 3.12.1 Explain that the transformation of energy usually results in some energy in the form of heat, which spreads by radiation, conduction, and sometimes convection into cooler places.	Heat and Temperature
E/S 3.5.2 Investigate and describe how energy can be used to bring about changes in matter (e.g., melting an ice cube).			E/S 3.8.2 Investigate and describe how all phase changes are accompanied by changes in energy.	I/L 3.12.2 Investigate and describe how pressure may affect changes of state.	Changes of State

Content Standard 3.0: **Energy and Matter: Interactions and Forms**

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
I/S 3.5.3 Investigate and describe how vibrations produce sound.		3.7.3 Investigate and describe that forms of energy can travel in waves (e.g. seismic, light, radio, tv).	I/S 3.8.3 Investigate and describe how waves transfer energy and move at different speeds in different materials.	I/S 3.12.3 Investigate and describe how waves can **superimpose** on one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change direction when entering a new material.	Waves

Superimpose – To place or lay over or above something.

Content Standard 3.0: **Energy and Matter: Interactions and Forms**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/S 3.5.4 Describe how electrical components are utilized in the design of simple electrical circuits.	3.6.4 Investigate and describe how electrical energy can be transferred through various materials.		I/S 3.8.4. Investigate, create, and describe parallel, series, and combination circuits.	I/L 3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.	Electrical Circuits
	3.6.5 Investigate and describe how energy exists in different forms (e.g. heat, light, chemical, electrical, and others).		E/S 3.8.5 Investigate and describe how energy may be transferred into or out of a system or object in many ways and readily changes forms.	E/L 3.12.5 Investigate and describe how matter and energy may be changed and energy can be transferred in many ways, but the entire **mass-energy budget** of the universe remains constant.	Changes in Energy

Mass-Energy Budget – The total amount of energy in the universe.

Content Standard 3.0: **Energy and Matter: Interactions and Forms**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			E/S 3.8.6 Identify the energy involved in a particular process as potential (energy of position and stored chemical energy) or kinetic (energy of motion).	W/L 3.12.6 Investigate and describe how systems tend to become less ordered over time.	Descriptions of Energy and Order

Physical Science

Content Standard 4.0: **Chemical Reaction**—*Students understand that chemical reactions change substances into different substances.*

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
I/L 4.5.1 Investigate and describe how observable changes in matter may occur when different materials are heated, mixed, or cooled.			E/S 4.8.1 Investigate and describe how in **chemical reactions**, the total mass is conserved and the elements involved do not change into other elements.	I/S 4.12.1 Investigate and describe how, in chemical reactions, elements combine in predictable ratios, and the numbers of **atoms** of each element do not change.	Conservation of Matter
	4.6.2 Investigate and describe how chemical reactions may be fast or slow.		E/S 4.8.2 Investigate and describe how the rate of a chemical reaction can be influenced by variables such as temperature, **pH**, and light.	E/S 4.12.2 Investigate and describe how chemical reaction rates depend on conditions in the reacting system, the properties of reacting materials, and the presence of certain rate-regulating chemicals.	Rates of Chemical Reactions

Chemical Reaction – The process in which substances change into other substances. This occurs at the level of atoms and molecules.
Atom – The smallest part of a chemical element which can take part in a chemical reaction.
pH – A measure of the degree to which a substance is an acid or a base.

Content Standard 4.0 Chemical Reaction

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			E/S 4.8.3 Investigate and describe how materials may give off heat or light when they react chemically with each other.	I/S 4.12.3 Investigate and describe how chemical reactions may release or consume energy.	Transformation of Matter and Energy
			E/S 4.8.4 Predict common properties of elements using the Periodic Table.	I/L 4.12.4 Relate the chemical properties of an element to the outermost electrons of an element.	Chemical Properties

Physical Science

Content Standard 5.0: **Nuclear Energy and Electromagnetic Energy**—*Students understand that nuclear energy and electromagnetic energy are produced from both natural and human-made sources in many forms.*

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
	5.6.1 Describe light in terms of simple properties (e.g. color, brightness).		I/S 5.8.1 Investigate and describe how light interacts with matter by moving through the matter, being absorbed by matter, or being scattered by the matter.	I/S 5.12.1 Predict how light interacts with matter (e.g., reflection and refraction).	Behaviors of Light
			W/L 5.8.2 Describe some applications of **radioactive isotopes** including using nuclear energy to produce heat. H 10.8.1	W/L 5.12.2 Simulate how the predictable rates of **nuclear reactions** can be used to estimate the age of some materials.	Nuclear Applications

Radioactive Isotopes – Very large atoms of elements that are unstable and undergo nuclear reactions to form new elements.
Nuclear Reaction – A change in the nucleus of an atom. Some nuclear reactions can result in the transfer of a tremendous amount of energy.

Content Standard 5.0: **Nuclear Energy and Electromagnetic Energy**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			I/S 5.8.3 Compare and contrast between high and low level nuclear wastes and their associated hazards. H 10.8.3	W/L 5.12.3 Describe the different disposal techniques used for high and low level nuclear wastes.	Nuclear Wastes

Content Standard 5.0: **Nuclear Energy and Electromagnetic Energy**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			E/S 5.8.4 Investigate and describe how the sun produces energy in a range of wavelengths within the **electromagnetic spectrum.**	E/S 5.12.4 Describe electromagnetic waves including a wide range of forms and varying wavelengths.	Electromagnetic Energy
			I/S 5.8.5 Compare and contrast the nuclear processes that occur in the sun and stars as well as in nuclear reactors.	W/L 5.12.5 Explain how the forces that hold the **nucleus** of an atom together are usually stronger than other forces that could make the nucleus fly apart.	Nuclear Structure and Processes

Electromagnetic Spectrum- The entire range of different types of electromagnetic waves, including visible light, X-rays, and radiowaves.
Nucleus (atomic) - The central region of an atom which contains more than 99% of the atom's mass.

Content Standard 5.0: **Nuclear Energy and Electromagnetic Energy**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			W/L 5.8.6 Explain how nuclear reactions convert small amounts of matter into a relatively large amount of energy.	W/L 5.12.6 Explain how energy is released when the nuclei of very heavy atoms (e.g., uranium or plutonium), split into middleweight ones, or when very light nuclei (e.g., hydrogen and helium), combine into heavier ones.	Nuclear Energy

Life Science

Content Standard 6.0: Structure and Function—*Students understand that all life forms, at all levels of organization, use specialized structures and similar processes to meet life's needs.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/S 6.5.1 Investigate, compare, and contrast the different life cycles of different living things.			W/L 6.8.1 Explain how disease is a breakdown in structures or functions of an organism due to intrinsic system failures or damage caused by infection.	W/S 6.12.1 Explain how disease disrupts the **equilibrium** that exists in a healthy organism.	Life Cycles and Disruptions
E/S 6.5.2 Investigate, compare, and contrast the different structures of organisms that serve different functions for growth, reproduction, and survival.			E/S 6.8.2 Investigate and describe how multicellular living things have tissues, organs, and organ systems that are specialized to perform life functions.	I/S 6.12.2 Explain how the human body has a specialized anatomy and physiology composed of an hierarchical arrangement of **differentiated cells.**	Structures, Functions, and Systems

Equilibrium – Balance, as between two opposing forces.
Differentiated Cells – Cells which have become modified and specialized within an organism.

Content Standard 6.0: Structure and Function

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/S 6.5.3 Investigate and describe how plants and animals have features that help them live in various environments.			I/S 6.8.3 Investigate and describe how cells, grow, divide, and take in nutrients, which they use to provide energy for cellular functions.	E/S 6.12.3 Investigate and describe how food molecules are broken down through a series of chemical reactions to provide energy and the material to make new molecules.	Environment, Energy, and Cellular Functions
			W/L 6.8.4 Investigate and describe how most organisms are comprised of a single cell and others are multicellular.	I/S 6.12.4 Investigate and describe how every cell is covered by a cell membrane and most cells also have specialized parts for the transport of materials, energy, transfer, protein building, waste disposal, information feedback, and movement.	Cellular Organization

Content Standard 6.0: **Structure and Function**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			I/S 6.8.5 Investigate and describe how plants have specialized structures and systems for a variety of functions.	E/S 6.12.5 In **photosynthesis**, plants and many microorganisms use solar energy to combine molecules of carbon dioxide and water to form energy rich compounds and oxygen.	Plant Structures and Functions
			I/S 6.8.6 Explain how information used to guide cellular functions is stored in **DNA**. H 10.8.1		Control of Cellular Functions

Photosynthesis – The process by which plants make their food from air and water using energy from the sun.
DNA –The genetic material of all cells and many viruses; DNA stands for deoxyribonucleic acid.

Life Science

Content Standard 7.0: Internal and External Influences on Organisms—*Students understand that organisms respond to internal and external influences.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
W/L 7.5.1 Investigate and describe how clues for behavior may be detected by the senses in humans and other living things.			I/L 7.8.1 Explain how behavior may be innate or learned.	I/L 7.12.1 Investigate and describe how some broad patterns of behavior exhibited by animals have evolved to ensure survival of the species.	Influences on Behavioral Patterns
I/L 7.5.2 Investigate and describe how some organisms can learn from their experiences.			I/S 7.8.2 Explain how an organism's behavior is based on experience and on the species' evolutionary history.	E/L 7.12.2 Investigate and describe how plant and animals have mechanisms that allow them to respond to changes in their environment.	Origins of Behavioral Patterns
I/L 7.5.3 Investigate and describe how some environmental conditions are more favorable than others to living things.			I/L 7.8.3 Investigate and describe how behavior is one kind of response an organism can make to an internal or environmental stimulus.	I/L 7.12.3 Investigate and describe how multicellular animals have nervous systems that receive input through sensory organs and generate behavioral responses.	Stimulus and Behavior

Content Standard 7.0: Internal and External Influences on Organisms

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			E/S 7.8.4 Explain how various **viruses, bacteria, fungi,** and **parasites** may infect the human body and interfere with normal body functions.	I/L 7.12.4 Explain how certain **viral diseases** make the body vulnerable to multiple infectious agents and cancerous cells by destroying critical cells of the immune system.	Disease

Virus – Any of a large group of disease-producing agents that are smaller than bacteria, are composed of DNA and an outer core of protein, and are dependent upon living cells for their reproduction and growth.

Bacteria – A large group of microscopic organisms that multiply by splitting or by growing from spores. They come in a variety of forms and though some may cause diseases, many are important in human processes .

Fungi – Plantlike organisms that lack chlorophyll and absorb their food from dead or living organisms (i.e., yeast, mushrooms, and molds).

Parasites – An organism that lives on another "host" organism from which it gets its food, examples include ticks and tapeworms.

Viral Disease – Diseases caused by viruses including AIDS, rabies, measles, polio, chicken pox, and the common cold.

Life Science

Content Standard 8.0: **Heredity and Diversity**—*Students understand that life forms are diverse, and that they pass some characteristics to their offspring.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/L 8.5.1 Investigate and describe how some characteristics between offspring and parents are inherited, but other characteristics are learned.			E/S 8.8.1 Explain how heredity is the passage of genetic instructions from one generation to another.	E/S 8.12.1 Explain how all body cells in an organism are developed from a single cell and contain essentially identical genetic instructions. Explain how different parts of the instruction are used in different kinds of cells.	Inherited Traits
I/L 8.5.2 Explain how living things may be classified on the basis of similar features, behaviors, and/or habits.			I/L 8.8.2 Classify organisms on the basis of similar characteristics, and explain the basis for such a classification system.	W/L 8.12.2 Explain how relatedness among organisms can be estimated from the similarity of their DNA sequences.	Variation and Classification of Organisms

Content Standard 8.0: Heredity and Diversity

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/S 8.5.3 Describe how there are variations among individuals within a population of a certain species.			I/L 8.8.3 Explain how new varieties of cultivated plants and domestic animals have resulted from **selective breeding** for particular traits. H 3.8.2	I/L 8.12.3 Investigate and describe how sorting and recombination of genes in sexual reproduction results in a great variety of possible gene combinations.	Variation

Selective Breeding – An artificial process by which only organisms possessing a particular characteristic are allowed to breed and produce offspring with that trait.

Content Standard 8.0: **Heredity and Diversity**

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
E/S 8.5.4 Reproduction is a characteristic essential to the continuation of every species.			E/S 8.8.4 Explain how genetic information coded in DNA is passed through sexual or asexual reproduction.	I/L 8.12.4 Explain how genetic information from parents is encoded in DNA molecules and provides instruction for assembling protein molecules.	Reproduction
			E/S 8.8.5 Explain how some patterns of inheritance can be explained by pairs of genes that separate when sex cells are formed.	E/S 8.12.5 Investigate and describe how patterns of inheritance are described by laws of segregation and independent assortment.	Patterns of Inheritance
			I/S 8.8.6 Identify that the basic level of biological classification is the species, which comprises all organisms that can mate with each other and produce fertile offspring.	E/S 8.12.6 Explain how diversity of species and variation among organisms within a species increase the chances for survival of life when large changes occur in the environment.	Diversity of Species

Content Standard 8.0: **Heredity and Diversity**

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
		8.7.7 Explain how the experiences an organism has during its lifetime can affect it.	I/S 8.8.7 Explain how changes in the genes of sex cells can affect offspring.	E/S 8.12.7 Explain how gene **mutations** may be caused by a variety of influences, when mutations occur in sex cells, they can be passed on to offspring.	Mutations

Mutation – A change within a gene of an organism that results in a new characteristic that can be passed on to offspring.

Life Science

Content Standard 9.0: **Evolution:** The Process of Biological Change—*Students understand that life forms change over time.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/S 9.5.1 Classify animals and plants according to their physical characteristics.			W/L 9.8.1 Explain that millions of species of animals, plants, and microorganisms are alive today.	E/S 9.12.1 Investigate and describe the basic idea of the theory of biological **evolution** is that through genetic and/or environmental influences the Earth's present-day species developed from earlier, distinctly different, but common ancestors.	Common Ancestry
I/L 9.5.2 Investigate and describe how environmental changes allow some plants and animals to survive and reproduce, but others may die.			E/S 9.8.2 Investigate and describe how biological evolution provides a scientific explanation for the differences and many similarities between species.	I/S 9.12.2 Explain the **fossil** record of ancient life forms by applying the idea of natural selection and its evolutionary consequences.	Natural Selection

Evolution – The process by which all living organisms have developed from earlier forms through modification of characteristics in successive generations.
Fossil –Any evidence of life from a previous geological age, including petrified bones or plant parts, and imprints.

Content Standard 9.0: **Evolution**

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
E/L 9.5.3 Investigate and describe how individuals of the same kind differ in their characteristics and sometimes the differences give an advantage in surviving and reproducing.			E/S 9.8.3 Investigate and describe how biological adaptations include changes that enhance survival and reproductive success in a particular environment.	I/L 9.12.3 Simulate and explain how the adaptation of a species can occur over many generations because of the unique characteristics that favor those individuals in an environment.	Adaptation

Content Standard 9.0: Evolution

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			I/S 9.8.4 Investigate and describe how unity among organisms is found in similarities of internal structures, chemical processes, and modern evidence of common ancestry.	I/S 9.12.4 Explain how the classification of species is based on similarities (e.g., structural, genetic, molecular) which indicate evolutionary relationships.	Evidence for the theory of Evolution
			I/S 9.8.5 Explain how extinction of a species occurs when the adaptive characteristics of a species are insufficient to allow it to survive environmental change.	I/S 9.12.5. Explain how the extinction of species is a common occurrence and fossil records indicate that most species that have lived on the earth no longer exist.	Extinction
				I/S 9.12.6. Investigate and describe how the process of evolution is driven by genetic and environmental influences.	Influences on Evolution

Content Standard 9.0: Evolution

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
				W/L 9.12.7 Explain how there is evidence that at least a billion years ago, cells with nuclei existed allowing the evolution of increasingly complex multicellular organisms.	Life Origins

Earth and Space Sciences

Content Standard 10.0: Earth Structures and Composition —*Students understand that the Earth is composed of interrelated systems of rocks, water, air, and life.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
W/L 10.5.1 Investigate and describe how rocks are composed of different combinations of minerals.			W/L 10.8.1 Investigate and describe how rocks and minerals have different properties and characteristics.	W/L 10.12.1 Investigate and describe how rocks and minerals have different characteristics that reflect their origins and use.	Rocks and Minerals
W/S 10.5.2 Investigate and describe how erosion and deposition rates can be affected by the slope of the land and by human activities. G 5.5.1; G 5.5.3; G 5.5.4; G 7.5.1; M 7.5.2; M 8.5.2; M 9.5.3; M 9.5.6			E/S 10.8.2 Investigate and describe how the combination of **constructive and destructive forces** result in the formation of landforms. G 3.8.1; G 3.8.2; G 5.8.1; G 5.8.5	E/S 10.12.2 Investigate and describe how landforms are the result of a combination of constructive and destructive forces resulting from weathering, erosion, and the movement of **lithosphere** plates. G 3.12.1; G 3.12.2	Landforms

Constructive Forces – Processes such as the collection of lithosphere plates or volcanic eruptions which raise the surface of the Earth.
Destructive Forces – Processes such as blowing wind or running water that lower the surface of the Earth.
Lithosphere – The solid portion of the Earth, including the crust and upper mantle.

Content Standard 10.0: Earth Structures and Composition

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
W/L 10.5.3 Investigate and describe how the surface of the Earth, including the ocean floor has a varied topography. G 1.5.2; G 2.5.1			E/S 10.8.3 Explain, using models, how the Earth is layered with a crust, both continental and oceanic, hot, convecting mantle, and dense, metallic core. G 3.8.1	I/L 10.12.3 Explain how there is a relationship between the relative densities and states (phases) of Earth materials and the layering on, in, and above the Earth.	Earth's Structure and Composition

Content Standard 10.0: Earth Structures and Composition

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/L 10.5.4 Investigate and describe how soil is made of many different biological and mineral materials, and varies from place to place.			I/L 10.8.4 Investigate and describe how soils have properties of color, texture, and capacity to retain water and provide nutrients for life. G 3.8.3	I/L 10.12.4 Investigate and describe how soil is derived from weathered rocks and decomposed organic material, and is found in layers.	Soil
			W/L 10.8.5 Explain how the atmosphere is a mixture of particular gases, whose properties vary with elevation. G 3.8.1; G 3.8.3	I/L 10.12.5 Explain how the composition of the Earth's atmosphere has changed in the past and continues to change.	Earth's Atmosphere
			E/S 10.8.6 Explain that earthquakes, landslides, volcanoes, and floods are geologic phenomena. G 2.8.6; G 3.8.1; G 3.8.2; G 5.8.5	I/L 10.12.6 Compare and contrast the **geologic features** of Nevada and local geological features. G 2.12.7	Geologic Processes and Features

Geological Features – Something found on the surface or interior of the Earth which has formed from geologic processes such as mountains, canyons, earthquakes, faults, rocks, minerals, etc.

Earth and Space Sciences

Content Standard 11.0: **Earth Models**—*Students understand that the Earth may be represented by a variety of maps and models.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
W/L 11.5.1 Identify compass directions on a map. G 1.5.1; G 1.5.5			W/L 11.8.1 Describe how positions on the Earth's surface can be located using latitude and longitude. G 1.8.1		Locating Positions on the Earth
W/L 11.5.2 Explain how the Nevada state road map is a tool that can be used to navigate from one location to another. G 1.5.1; G 1.5.4			W/L 11.8.2 Compare a variety of map types, and locate Nevada and Nevada features on each. G 1.8.2; G 1.8.5		Nevada and the Earth
W/L 11.5.3 Explain how many things can be represented by two-dimensional maps and three-dimensional models.	11.6.3 Investigate, design, and use various kinds of maps.		W/S 11.8.3 Use a color-coded map to compare and contrast various geological features such as temperature, population density, geology, or precipitation. G 1.8.2; G 1.8.3; G 1.8.4; G 1.8.5	W/L 11.12.3 Investigate, design, and use contour maps. G 1.12.1; G 1.12.2; G 1.12.3; G 1.12.4; G 1.12.5	Models of the Earth

Content Standard 11.0: Earth Models

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			W/L 11.8.4 Identify the time of day in various places throughout the world, given the local time of day. G 2.12.7	W/S 11.12.4 Define location on the Earth in terms of latitude, longitude, and time zones.	Time and Location on the Earth

Earth and Space Sciences

Content Standard 12.0: **Earth History**—*Students understand that Earth systems (such as weather and mountain formation) change on variety.*

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
E/S 12.5.1 Explain that the surface of the Earth changes due to a variety of factors (e.g., some are abrupt volcanoes and earthquakes, and others happen very slowly, such as the wearing down of mountains). G 2.5.6; G 7.5.1			E/S 12.8.1 Explain how some changes on the Earth's surface are due to slow processes, and others due to rapid processes. G 2.8.6; G 3.8.2	I/S 12.12.1 Explain how catastrophic events have occurred and greatly influenced Earth's history. G 2.12.5; G 2.8.6	Change Over Time
W/L 12.5.2 Investigate and describe how fossils are evidence of past life.			E/S 12.8.2 Investigate and describe how fossils provide important evidence of how life and environmental conditions have changed throughout geologic time.	I/L 12.12.2 Simulate and explain how relative geologic time can be estimated by observing rock sequences and using fossils to correlate the sequences at various locations.	Relative Geologic Time and the Fossil Record

Content Standard 12.0: Earth History

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			E/S 12.8.3 Explain how the Earth's processes we observe today are similar to those that occurred in the past.	W/L 12.12.3 Compare and contrast the variety of methods by which geologic time is determined, including **radioactive dating**.	Geologic Time

Radioactive Dating – The use of clock-like rate of decay of radioactive isotopes to determine the age of something.

Earth and Space Sciences

Content Standard 13.0: Cycles of Matter and Energy – *Students understand that Earth systems have a variety of cycles through which energy and matter continually flow.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/L 13.5.1 Explain that the sun is the main source of energy for people, which they use in many ways (e.g., **fossil fuels** derive their energy indirectly from the sun).			E/S 13.8.1 Investigate and describe how the sun is the major source of energy for phenomena on Earth's surface (e.g., growth of plants, winds, ocean currents, and the water cycle).	W/L 13.12.1 Explain how Earth systems have two major internal sources of energy (decay of radioactive isotopes and the gravitational energy from Earth's original formation) and one major external sources (the sun), all of which create heat.	Earth Energy Sources
I/L 13.5.2 Investigate and describe various meteorological phenomena (e.g., flooding, thunderstorms, and drought). G 1.5.3; G 3.5.2			E/S 13.8.2 Explain how global patterns of atmospheric movement, topography, and proximity to bodies of water influence local weather, and seasons are caused by variations in the amount of the sun's energy hitting the surface due to the tilt of the Earth's axis. H 3.8.1	I/S 13.12.2 Explain how uneven heating of the Earth's surface by the sun forms convection currents within the atmosphere and ocean, producing wind and ocean currents that are modified by the Earth's rotation.	Weather

Fossil Fuels – A fossil material that can be burned, including coal, petroleum, and natural gas.

Content Standard 13.0: Cycles of Matter and Energy

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/S 13.5.3 Investigate and describe the factors which affect the processes such as evaporation and condensation.			E/S 13.8.3 Explain how water, which covers the majority of the Earth's surface, circulates through the crust, oceans, and atmosphere.	E/S 13.12.3 Investigate and describe how water is a solvent, (e.g., how it dissolves minerals and gases as it passes through the water cycle and carries them to oceans and lakes)	Water

Content Standard 13.0: Cycles of Matter and Energy

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			I/S 13.8.4 Simulate and describe how clouds, latitude, altitude, topographical features, and proximity to large bodies of water affect weather and climate. G 3.8.1	W/L 13.12.4 Simulate and describe how global climate is determined primarily by energy transfer from the sun at and near the Earth's surface, and fluctuations in solar output may have contributed to large changes in the Earth's climate in the past.	Climate
E/S 13.5.5 Investigate and describe how change is an ongoing process that can be seen throughout the natural world.			E/L 13.8.5 Investigate and describe some changes that are reversible and others that are not.	W/L 13.12.5 Explain how large-scale, long-term equilibrium can accommodate small-scale changes.	The Nature of Change

Content Standard 13.0: Cycles of Matter and Energy.

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
				E/S 13.12.6 Investigate and describe how elements necessary for life on Earth pass through both living and non-living cycles in a series of changes that form a global system.	Bio-Geochemical Cycles

Content Standard 13.0: Cycles of Matter and Energy

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			W/L 13.8.7 Explain that the energy that the Earth receives over geologic time approximately equals the energy that it loses.	I/S 13.12.7 Compare and contrast the relationships between the **greenhouse effect** and the idea of global warming. G 3.12.1	Energy Transfer and Transformation in the Earth System
			E/S 13.8.8 Describe the relationships among **geothermal** and **tectonic** processes. G 3.8.1	W/L 13.12.8 Model and explain how the energy that propels the Earth's lithosphere plates is dominantly a result of nuclear processes deep in the Earth.	Earth's Internal Energy

Greenhouse Effect – Heat insulating effect that some gases such as carbon dioxide, water vapor, and methane have on the Earth's atmosphere.
Geothermal – Relates to the internal heat of the Earth.
Tectonic – Relates to the action of forces that cause deformities in the Earth's crust.

Earth and Space Sciences

Content Standard 14.0: The Solar System and the Universe—*Students understand that the Earth is part of a planetary system within the Milky Way Galaxy, which is part of the known universe.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/L 14.5.1 Investigate and describe the basic components of our solar system (e.g., planets, moons, asteroids, comets, and the sun).			W/L 14.8.1 Investigate and describe the size, composition, and surface features of the planets in our solar system.	W/L 14.12.1 Investigate and describe how the Earth's atmosphere, water, temperature, and composition compare with conditions on other planets.	The Solar System
I/L 14.5.2 Describe the apparent motion of celestial objects across the sky.			E/S 14.8.2 Investigate and describe how seasons, eclipses, moon phases, and tides are caused by the effects of relative motion and positions of the sun, Earth, and moon.	E/S 14.12.2 Explain how most objects in the solar system are in regular and predictable motion which explains such phenomena as the day, the year, phases of the moon, and eclipses.	Celestial Motion
W/L 14.5.3 Describe how the stars in the sky are not scattered evenly, and they are not all the same in brightness or color.			W/L 14.8.3 Explain that billions of galaxies form most of the visible mass in the universe.	W/L 14.12.3 Explain how stars produce energy and elements heavier than hydrogen from nuclear reactions.	Stars and Galaxies

Content Standard 14.0: The Solar System and the Universe

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
				W/L 14.12.4 Explain that on the basis of scientific evidence, the universe is estimated to be about ten billion years old.	Origin of the Universe
			I/L 14.8.5 Explain how various tools (e.g., optical and radio telescopes, unmanned robotic spacecraft) allow us to investigate objects in the sky that are too distant, faint, or bright to observe directly from Earth. M 9.8.5; H 10.8.1	W/L 14.12.5 Describe how increasingly sophisticated technology (e.g., mathematical models and computer simulations) is used to learn about the universe. M 9.12.5; M 9.12.7	Tools and Methods of Astronomy

Content Standard 14.0: The Solar System and the Universe

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			I/S 14.8.6 Investigate and describe the laws of motion and gravity and their development. M 2.8.2; M 8.8.3; M 9.8.3	W/S 14.12.6 Explain that the physical laws, such as laws of Newton, Kepler, thermodynamics, relativity, and quantum physics, appear to apply to all bodies in the universe.	Universality of Physical Laws

Environmental Sciences

Content Standard 15.0: Ecosystems—*Students will demonstrate an understanding that ecosystems display patterns of organization, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/S 15.5.1 Investigate and describe how organisms interact with each other and with non-living parts of their habitats.			E/S 15.8.1 Investigate and describe how living and non-living components of ecosystems interact in various ways. G 3.8.3; G 3.8.4	E/S 15.12.1 Investigate and describe how changes in an ecosystem can affect **bio-diversity** and bio-diversity contributes to an ecosystem's stability. G 3.12.1; G 3.12.3	Stability and Change in Ecosystems
I/S 15.5.2 Investigate and describe how, for any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.			I/L 15.8.2 Characterize organisms in any ecosystems by their function. G 3.8.3; G 3.8.4	E/S 15.12.2 Investigate and describe how ecosystems change or remain the same in response to different kinds of influences. G 3.12.1; G 3.12.3	Relationships and Interactions in Ecosystems

Bio-diversity – The number and variety of different organisms in the region in which they occur.

Content Standard 15.0: Ecosystems

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/S 15.5.3 Explain how the sun is the primary source of energy for nearly every ecosystem and that living things get what they need to survive from their environments.			E/S 15.8.3 Investigate and describe how the major energy source in most ecosystems is sunlight which is converted by producers into chemical energy. G 3.8.3	E/S 15.12.3 Investigate and describe how materials and energy are cycled and recycled through ecosystems via pathways known as food webs.	Cycles of Matter and Energy in Ecosystems
I/L 15.5.4 Investigate and describe how the local ecosystem has unique characteristics. G 3.5.4			I/L 15.8.4 Describe how geographically distinct ecosystems on the Earth have similarities and differences. G 3.8.3; G 3.8.4	I/L 15.12.4 Describe the unique geologic, hydrologic, climatic, and biological characteristics of Nevada's **bioregions.** (e.g. Northern NV cold desert, Southern low warm desert, Mountain). G 3.12.1	Characteristics of Ecosystems

Bioregion – A geographical region that is characterized by very general shared ecological qualities.

Environmental Sciences

Content Standard 16.0: Natural Resources—*Students demonstrate and understand that natural resources include renewable and non-renewable materials and energy. All organisms, including human, use resources to maintain and improve their existence, and the use of resources can have positive and negative consequences.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/L 16.5.1 Investigate and describe how resources have distinct properties which determine their usefulness. Ec 6.5.1			E/S 16.8.1 Investigate and describe the identifying characteristics of renewable and non-renewable resources. G 5.8.6	I/L 16.12.1 Evaluate the consequences of changing patterns of resources use. Ec 6.12.2; G 3.12.3; G 5.12.1; G 5.12.6; G 5.12.7	Renewable and Nonrenewable Resources
W/L 16.5.2 Investigate and describe how technology can be used to extend resources (e.g., recycling).			E/S 16.8.2 Explain how some natural resources are limited in their abundance and/or accessible location (e.g. water in the desert). Ec 6.8.3; G 4.8.6; G 5.8.2; H 3.8.5	W/L 16.12.2 Investigate and describe the various processes involved in obtaining, using, and recycling materials such as wood products, minerals, food, and manufactured objects. Ec 6.12.2; G 5.12.7	Acquisition and Use of Natural Resources

Content Standard 16.0: Natural Resources

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/L 16.5.3 Explain how Earth materials, including those found in Nevada, provide many of the resources that humans use. Ec 6.5.1; G 5.5.1; G 5.5.6			I/L 16.8.3 Investigate and describe the location and distribution of various natural resources. Ec 6.8.1; G 4.8.6	W/L 16.12.3 Investigate and describe the career opportunities associated with the study, exploration, extraction, utilization, protection, and restoration of natural resources. Ec 6.12.7	Traditional and Innovative Uses of Natural Resources
W/L 16.5.4 Explain that humans tend to use resources to meet more than their minimal needs for food, shelter and warmth.			I/L 16.8.4 Investigate and describe how organisms alter their local environment through their use of natural resources. G 3.8.3; G 5.8.1	E/S 16.12.4 Analyze and describe the limitations of the Earth's ability to respond to stresses produced by human or natural activities. G 3.12.1; G 3.12.3; G 5.12.1	Environmental Consequences of Natural Resource Use

Content Standard 16.0: Natural Resources

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
			E/L 16.8.5 Describe how unintended consequences of technologies can cause resource depletion and environmental degradation, but technology can also increase resource availability, mitigate environmental degradation, and make new resources economical. G 5.8.1; H 10.8.3; H 10.8.1	E/S 16.12.5 Analyze and evaluate the effects that increases in human populations can cause (e.g., resource depletion and environmental degradation). Ec 6.12.3; G 3.12.1; G 3.12.3; G 5.12.1; G 5.12.6	Technology and Human Population

Environmental Sciences

Content Standard 17.0: Conservation—*Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole and future generations.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
W/L 17.5.1 Investigate and describe how consumptive patterns of people vary in different places. G 5.5.6; G 5.5.7		17.7.1 Investigate and explain that Nevada has a variety of useful resources.	I/L 17.8.1 Analyze different conservation options for Nevada's resources. G 5.8.7; H 10.8.3	W/L 17.12.1 Analyze and evaluate how consumption patterns, conservation efforts, and cultural or social practices in countries have varying environmental impacts. G 3.12.1; G 3.12.3; G 3.12.4; G 3.12.5; G 5.12.1; G 5.12.4; G 5.12.7	Conservation
I/S 17.5.2 Investigate and describe that ecosystems have components that can be observed to change, while other components appear to stay the same.			I/L 17.8.2 Investigate and describe how in some ecosystems, populations of organisms are in **dynamic equilibrium**, and in other ecosystems they are not. G 2.8.6; G 3.8.3; G 3.8.4	E/S 17.12.2 Investigate and describe how human actions may impact the dynamic equilibrium of global systems (e.g., global warming, ozone depletion). G 3.12.1; G 3.12.3; G 3.12.4; G 3.12.5; G 4.12.2; G 5.12.1; G 5.12.3 G 5.12.7	Systems and Equilibrium
I/S 17.5.3 Explain that changes in environments can be natural events or influenced by human activities. G 5.5.3; G 5.5.4			E/L 17.8.3 Evaluate how changes in environments can be beneficial or harmful. G 2.8.6; G 3.8.3; G 5.8.1; H 10.8.3	W/L 17.12.3 Explain that there is scientific uncertainty regarding many environmental issues. G 3.12.5	The Scientific Nature of Environmental Issues

Dynamic Equilibrium - A state of balance in which two opposing processes are occurring at equal rates.

Content Standard 17.0: Conservation

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
			I/L 17.8.4 Investigate and describe how actions which might affect Nevada's environment can be evaluated in terms of trade-offs that may have regional, national, or global effects. G 2.8.6; G 5.8.1; H 10.8.3	I/L 17.12.4 Evaluate and describe actions which affect the global environment in terms of trade-offs that may have effects on local environments or economics. G 3.12.5; G 4.12.9; G 5.12.2; G 5.12.7	Responsible Behavior

The Nature and History of Science

Content Standard 18.0: Scientific, Historical, and Technological Perspectives-- *Students understand that science is a unique way of knowing about things. Many men and women have contributed to the traditions of science. The ability to pursue activities and careers in science is accessible to people from all cultures and all levels of ability.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/L 18.5.1 Explain that science is a systematic way of exploring the world.			E/S 18.8.1 Explain that scientific investigations involve the use of logic, respect for the rules of evidence, openness to criticism, and public reporting of methods and procedures. C 5.8.6	W/S 18.12.1 Explain that the scientific way of knowing uses a critique and consensus process (e.g., peer review, openness to criticism, logical argument, skepticism). E 1.12.3; E 11.12.1; E 11.12.2	The Nature of Science
E/S 18.5.2 Develop explanations using observations (evidence) from investigations.			I/L 18.8.2 Explain that scientific inquiry done in a school setting is similar to what scientists do.	W/L 18.12.2 Investigate and explain how research emphasis is influenced by economic and public policy. E 1.12.3	Attributes of Scientific Research

Content Standard 18.0: Scientific, Historical, and Technological Perspectives

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
W/L 18.5.3 Describe key scientists, classical experiments in science, and technological inventions that lead to a better understanding of the impact of science on society.		18.7.3 Investigate and describe how people create models to explain the world as scientific knowledge has increased, and that these models are modified or discarded.	I/L 18.8.3 Explain, using examples, that ancient peoples provided knowledge about the natural world that is still regarded as valid today, even though that knowledge may not have originated by scientific methods.	W/L 18.12.3 Investigate and explain how scientific innovations that were originally challenged are now widely accepted. E 1.12.3	The History of Science and Invention
W/L 18.5.4 Recognize and explain that science is an activity done by more than one person working together.			E/L 18.8.4 Explain that scientists may work in teams and some may work alone, but all communicate extensively with each other.	W/L 18.12.4 Explain that scientists work with others to resolve differences in interpretation of observations. E 1.12.3	Science as a Collaborative Process

Content Standard 18.0: Scientific, Historical, and Technological Perspectives

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
W/L 18.5.5 Explain that technology enables scientists and others to study the motion of objects that are moving rapidly or that are hardly moving at all.	18.6.5 Identify and describe various technological tools that scientists use to help them do their work.		W/L 18.8.5 Explain that scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world and engineers propose solutions relating to human problems, needs, and aspirations.	W/L 18.12.5 Explain that technological problems create a demand for new scientific knowledge and new technologies which make it possible for scientists to extend their research in new ways or to undertake entirely new lines of research. M 6.12.13; M 6.12.14; E 1.12.3	Technology

Content Standard 18.0: Scientific, Historical, and Technological Perspectives

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/S 18.5.6 Explain that science is an ongoing process of investigation (inquiry).			E/S 18.8.6 Explain that scientific knowledge is revised through a process of incorporating new evidence gained through continual investigation.	W/L 18.12.6 Explain that scientific knowledge builds on previous information, and rarely are entire theories completely discarded in favor of new ones. E 1.12.3	The Dynamic Character of Scientific Knowledge
			I/L 18.8.7 Identify and describe how science is subject to strengths and limitations related to other human social and intellectual activities.	W/L 18.12.7 Explain that scientists have ethical procedures, violations of which have consequences. E 1.12.3	Scientific Ethics

The Nature and History of Science

Content Standard 19.0: Reasoning and Critical Response Skills—*Students understand that many decisions require critical consideration of scientific evidence.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			E/S 19.8.1 Identify and evaluate critically the use of statistics, data, and graphs. E 2.8.4; E 4.8.4; G 7.8.3; M 5.8.5; M 6.8.5; M 7.8.12	I/S 19.12.1 Identify and determine the credibility of sources of information based on the techniques used to gather that information. E 3.12.3; E 4.12.3; G 7.12.2; M 5.12.5	Evaluating Data
			I/L 19.8.2 Give examples of human activities with their associated benefits, costs and risks. Ec 1.8.3	W/L 19.12.2 Apply cost benefit and risk analyses in decision-making processes. E 3.12.3; E 4.12.3; Ec 1.12.3; G 7.12.4; M 6.12.1; M 6.12.7; M 9.12.6	Analyzing and Evaluating Benefits and Risks
	19.6.3 Investigate and describe the components of systems (including processes or parts).	19.7.3 Identify and describe how the parts of a system relate to one another and/or to other systems.	W/L 19.8.3 Analyze and describe a system for efficiency, optimal function, and possible sources of malfunction. M 6.8.2; M 6.8.9	W/L 19.12.3 Recognize and describe situations in which a system is qualitatively different from the parts which comprise it (e.g., how a population differs from an individual). E 3.12.3; E 4.12.3; M 8.12.4	Analyzing Systems

Content Standard 19.0: Reasoning and Critical Response Skills

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/S 19.5.4 Explain that claims must be supported by evidence and logical argument. Ec 3.5.1; Ec 7.5.6; Ec 9.5.1	19.6.4 Distinguish between fact and opinion when responding to information.		E/S 19.8.4 Critically evaluate information to distinguish between fact and opinion when responding to information. C 4.8.4; E 4.8.4	I/S 19.12.4 Distinguish between hypotheses, laws, theories and rules, and explain the level of their limitations. E 3.12.3; E 4.12.3; E 4.12.4	Critical Analysis
				W/S 19.12.5 Determine the limits of generalizations, assumptions, analogies, and models. E 3.12.3; E 4.12.3; E 4.12.5; G 7.12.5	Critical Evaluation

Scientific Inquiry: Processes and Skills

Content Standard 20.0: Systems, Models, Risk, and Predictions—*Students understand that a variety of models can be used to describe or predict things and events.*

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
E/L 20.5.1 Develop a physical model to explain how something works or how something is constructed. M 7.5.8; M 8.5.2; M 9.5.3			W/L 20.8.1 Investigate and describe how different models can be used to demonstrate the same thing.	W/S 20.12.1 Use mathematical symbols and formulas to express relationships that behave in the same ways as the objects or processes under investigation. M 2.12.2; M 7.12.4; M 7.12.9	Models
I/S 20.5.2 Predict that some events are more likely to happen than others.	20.6.2 Analyze data to predict likely outcomes (e.g., how temperature range can affect the survival rate of a species).		I/L 20.8.2 Use a model to predict change (e.g., stream table). M 2.8.2	I/S 20.12.2 Use models to identify and predict cause-effect relationships (e.g., effect of temperature on gas volume, effect of carbon dioxide level on the greenhouse effect). E 3.12.3; Ec 3.12.2; G 7.12.4; M 2.12.3	Models and Predictions

Content Standard 20.0: Systems, Models, Risk, and Predictions

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
I/S 20.5.3 Describe and compare the components and interrelationships of a simple system (e.g., trace the flow of water through an aquarium, a filter, and a pump).			E/S 20.8.3 Identify and illustrate natural cycles within systems (e.g., water, planetary motion, climate, geological changes).	W/L 20.12.3 Identify and describe how systems are often different from their components. (e.g., aquaria or automobiles)	Systems
			I/S 20.8.4 Analyze data from two groups, comparing both their middles and ranges.	I/S 20.12.4 Compare groups of data, taking into account both percentages and actual numbers. Ec 2.12.7; G 7.12.4	Statistical Modeling
			E/L 20.8.5 Use a systematic approach to thinking critically about risks and benefits. M 6.8.5	I/L 20.12.5 Identify the type of hazard, estimate the extent and consequences of exposure, and determine the options for reducing or eliminating risks.	Risk Analysis

Scientific Inquiry: Processes and Skills

Content Standard 21.0: Scientific Values and Attitudes—*Students understand that science is an active process of systematically examining the natural world.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/L 21.5.1 Keep records of investigations and observations, without changing those records later. E 9.5.5			I/L 21.8.1 Explain why it is important to keep honest, clear, and accurate records.	W/L 21.12.1 Demonstrate curiosity, honesty, and skepticism in doing science.	Scientific Investigations
E/S 21.5.2 Make careful observations and test things more than once.			I/L 21.8.2 Explain that hypotheses are valuable even if they turn out to be incorrect, if they lead to fruitful investigations. M 6.8.5	W/L 21.12.2 Repeat experimentation for statistical analysis and to produce conclusions that are without bias. M 5.12.5; M 6.12.5	Repeating Scientific Trials
I/L 21.5.3 Offer reasons for findings and consider the reasons suggested by others. E 10.5.4; M 7.5.10; M 7.5.13; M 7.5.16			I/L 21.8.3 Describe how different explanations can often be given for the same evidence, and it is not always possible to tell which one is correct. E 10.8.4	W/S 21.12.3 Evaluate multiple explanations for the same evidence. M 5.12.5; M 6.12.5; M 6.12.7; M 6.12.9; M 6.12.11; M 7.12.11; E 10.12.4	Generating Multiple Explanations

Scientific Inquiry: Processes and Skills

Content Standard 22.0: Communication Skills—*Students understand that a variety of communication methods can be used to share scientific information.*

By the end of **Grade 5**, students know and are able to do everything required in previous grades and:	By the end of **Grade 6**, students know and are able to do everything required in previous grades and:	By the end of **Grade 7**, students know and are able to do everything required in previous grades and:	By the end of **Grade 8**, students know and are able to do everything required in previous grades and:	By the end of **Grade 12**, students know and are able to do everything required in previous grades and:	
W/L 22.5.1 Give written or oral instructions that others are able to follow. E 5.5.2			I/S 22.8.1 Write clear, step-by-step instructions for a procedure. E 5.8.2; E 9.8.5	I/S 22.12.1 Analyze experimental procedures and suggest appropriate revisions for improvement. E 4.12.6; E 5.12.2	Writing and Following Instructions
I/S 22.5.2 Organize information into charts, tables, and graphs. G 7.5.3; E 11.5.5; M 5.5.1; M 7.5.8			E/S 22.8.2 Organize information in tables and graphs and describe the relationships they reveal. E 5.8.2; M 5.8.1; M 7.8.9; G 7.8.3	E/S 22.12.2 Use tables, charts, and graphs in making arguments and claims in oral and written presentations. M 5.12.1; M 5.12.6; M 7.12.9; Ec 2.12.2; Ec 2.12.4; G 7.12.3	Working With Graphical Models
I/L 22.5.3 Collaborate on a group project. E 10.5.1; 5 10.5.3			I/L 22.8.3 Discuss scientific topics by paraphrasing, asking for clarification or elaboration, and expressing alternative positions using available multimedia resources. E 10.8.1; E 10.8.2; E 10.8.3; E 10.8.4; E 11.8.5; C 5.8.6	W/L 22.12.3 Discuss scientific topics by restating or summarizing accurately what others have said; ask for clarifications or elaborations, and express alternative positions using available multimedia resources. E 10.12.1; Ec 2.12.3; G 4.12.4; M 7.12.1	Working With Others

Scientific Inquiry: Processes and Skills

Content Standard 23.0: Scientific Applications of Mathematics—*Students understand that scientific inquiry is enhanced and often communicated by using mathematics.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/S 23.5.1 Explain that sometimes changing one thing causes changes in another. Ec 3.5.2; Ec 3.5.3			W/L 23.8.1 Explain that quantities can vary in proportion to one another. (e.g., the ratio of mass to volume in the calculation of density). M 3.8.5	W/L 23.12.1 Determine if the correlation between variables is high or low. M 6.12.1; G 7.12.4	Variables
W/L 23.5.2 Explain to other students how to go about solving numerical problems M 7.5.1; M 7.5.8; M 7.5.10; M 7.5.16			I/L 23.8.2 State the purpose of each step in a calculation. M 1.8.3	W/L 23.12.2 Use algebraic equations when appropriate. M 1.12.1; M 2 12.3; M 2.12.4; M 2.12.5; E 11.12.5; G 7.12.4	Computing
I/L 23.5.3 Make quantitative estimates of familiar lengths, weights, and time intervals, and check them by measurements.			W/L 23.8.3 Estimate probabilities of outcomes in familiar situations. M 5.8.1; M 1.8.7	W/L 23.12.3 Estimate answers to the correct order of magnitude. M 1.12.1; G 7.12.4	Estimating

Scientific Inquiry: Processes and Skills

Content Standard 23.0: Scientific Applications of Mathematics

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
W/L 23.5.4 Recognize the appropriate unit for a particular measurement (e.g., meters for length, seconds for time, and kilograms for mass). *(aligns with grade 3 math standard)*			E/S 23.8.4 Select and use the appropriate SI unit for a particular measurement (e.g., meters for length, seconds for time, and kilograms for mass).	I/S 23.12.4 Use derived quantities, ratios, proportions, and constants. M 1.12.1; M 3.12.5	Working With Measurements
W/L 23.5.5 Recognize that repeated measurements of the same thing are likely to vary slightly.			I/S 23.8.5 Judge whether repeated measurements and computations of quantities are reasonably precise and accurate. M 3.8.2	W/L 23.12.5 Trace the source of differences between an estimate and the calculated answer that exceeds agreed-upon standards for precision. M 3.12.3	Evaluating Measurements
			I/L 23.8.6 Make predictions based on all known data from similar conditions. M 5.8.6	W/L 23.12.6 Select samples by some random system to avoid bias. M 5.12.5	Validity of Samples

Scientific Inquiry: Processes and Skills

Content Standard 24.0: Laboratory Skills and Safety—*Students can appropriately and safely apply the tools and techniques of scientific inquiry.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
E/L 24.5.1 Use safety equipment and attire.	24.6.1 Use safety equipment and attire.	24.7.1 Use safety equipment and attire.	E/S 24.8.1 Use instruments and laboratory safety equipment properly.	E/L 24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.	Working Safely
I/L 24.5.2 Measure and mix dry and liquid materials safely in prescribed amounts.			E/L 24.8.2 Handle and dispose of chemicals according to established standards.	W/L 24.12.2 Use the information found in materials safety data sheets to handle, store, and dispose of chemicals properly. M 9.12.8	Working With Chemicals
I/L 24.5.3 Use provided materials to construct objects for a particular task.			I/L 24.8.3 Choose appropriate common materials for making and repairing simple mechanical constructions.	W/L 24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.	Using Experimental Apparatus

Content Standard 24.0: Laboratory Skills and Safety

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
I/S 24.5.4 Label measurements and diagrams properly.			E/L 24.8.4 Keep an organized record of scientific investigations. E 5.8.5; E 6.5.5; E 6.8.6; E 7.8.1; E 7.8.3; E 7.8.4; E 7.8.5; E 11.8.3; E 11.8.4	E/L 24.12.4 Maintain a permanent record of procedures, data, analyses, decisions, and understandings of scientific investigations. M 2.12.2	Recording Data
I/L 24.5.5 Use appropriate technology in lab procedures for measuring and recording. M 6.5.13; M 6.5.14			I/L 24.8.5 Use appropriate technology in laboratory procedures for measuring, recording, and analyzing data (e.g., computers, graphing calculators, and probes). M 6.8.13; M 6.8.14; G 7.8.2; M 9.8.6; M 9.8.5	W/S 24.12.5 Write procedures for the investigation of delegated or original scientific problems.	Writing and Following Laboratory Procedures and Problem Solving
E/L 24.5.6 Manipulate objects and observe events in an experiment.			E/S 24.8.6 Design a controlled experiment.	I/L 24.12.6 Carry out an independent scientific investigation. G 7.12.1	Designing and Conducting Experiments

Glossary for Science

Atom	The smallest part of a chemical element which can take part in a chemical reaction.
Bacteria	A large group of microscopic organisms that multiply by splitting or by growing from spores. They come in a variety of forms and though some may cause diseases, many are important in human processes.
Bio-diversity	The number and variety of different organisms in the region in which they occur.
Bioregion	A geographical region that is characterized by very general shared ecological qualities.
Chemical Reaction	The process in which substances change into other substances. This occurs at the level of atoms and molecules.
Chemical Reactivity	How likely a substance is to undergo change to a new substance.
Circuit (electrical circuit)	An assembly of electrical parts.
Conductor	A material that carries a force such as metal carries heat or electricity.
Constructive Forces	Processes such as the collection of lithosphere plates or volcanic eruptions which raise the surface of the Earth.
Density	The relationship that exists between mass and volume of an object (i.e., cube of styrofoam has less density than an equal –size cube of rock).
Destructive Forces	Processes such as blowing wind or running water that lower the surface of the Earth.
Differentiated Cells	Cells which have become modified and specialized within an organism.
DNA	The genetic material of all cells and many viruses; DNA stands for deoxyribonucleic acid.
Dynamic Equilibrium	A state of balance in which two opposing processes are occurring at equal rates.
Ecosystem	A system of relationships between organisms in an environment, and between organisms and the environment.
Efficiency	How close a machine is to operating without the loss of energy due to friction.
Electromagnetic Force	The unified force of electricity and magnetism.
Electromagnetic Spectrum	The entire range of different types of electromagnetic waves, including visible light, X-rays, and radiowaves.
Electron	Negatively charged particle in an atom.

Equilibrium	Balance, as between two opposing forces.
Evolution	Biological evolution – the process by which all living organisms have developed from earlier forms through modification of characteristics in successive generations.
Extrinsic Property	A property of material that depends on the amount of material present, for example, mass, length, volume.
Force	Any push or pull.
Force of Attraction	A pull between two objects (i.e., gravity and electrostatic attraction).
Fossil	Any evidence of life from a previous geological age, including petrified bones or plant parts, and imprints.
Fossil Fuels	A fossil material that can be burned such as coal, petroleum, and natural gas.
Fungi	Plantlike organisms that lack chlorophyll and absorb their food from dead or living organisms (i.e., yeast, mushrooms, and molds).
Germs	A microscopic organism which can cause disease.
Gravity	The attractive force between any two objects.
Greenhouse Effect	Heat insulating effect that some gases such as carbon dioxide, water vapor, and methane have on the Earth's atmosphere.
Geological Features	Something found on the surface or interior of the Earth which has formed from geologic processes such as mountains, canyons, earthquakes, faults, rocks, minerals, etc.
Geothermal	Relates to the internal heat of the Earth.
Heterogeneous Mixtures	A mixture in which the components are unevenly distributed and may be seen to separate into two or more distinct parts; examples include salad dressing, sand and iron filings, and smoke in the air.
Homogeneous Mixtures	A mixture in which all of the components are evenly distributed, with no visible distinct parts; examples include salt water and air.
Intrinsic Property	A characteristic of a sample of material related only to the quality of the material itself and not on the amount of material present; examples include density, color, odor, and hardness.
Kinetic Molecular Theory	A theory that all material is made of tiny particles that are in constant motion; this provides a model that is useful for describing why states of matter have their particular properties and behaviors.
Landform	A large feature on the surface of the Earth, including mountains, volcanoes, and canyons, etc.
Laws of Motion	Also called Newton's Laws of Motion; a set of laws that describe relationships among force and motion.
Lithosphere	The solid portion of the Earth, including the crust and upper mantle.

Mass-Energy Budget	The total amount of energy in the universe.
Matter	Anything that has mass and takes up space.
Mechanical Advantage	The degree to which a machine makes work easier by decreasing either the force or distance needed to move something.
Model	A physical, graphical, or mathematical representation of a thing or event.
Mutation	A change within a gene of an organism that results in a new characteristic that can be passed on to offspring.
Nuclear Reaction	A change in the nucleus of an atom. Some nuclear reactions can result in the transfer of a tremendous amount of energy.
Nucleus (atomic)	The central region of an atom which contains more than 99% of the atom's mass.
Parasites	An organism that lives on another "host" organism from which it gets its food, examples include ticks and tapeworms.
pH	A measure of the degree to which a substance is an acid or a base.
Photosynthesis	The process by which plants make their food from air and water using energy from the sun.
Pressure	Force applied per unit of area.
Properties	Characteristics unique to a particular set of living or nonliving things.
Radioactive Dating	The use of clock-like rate of decay of radioactive isotopes to determine the age of something.
Radioactive Isotopes	Very large atoms of elements that are unstable and undergo nuclear reactions to form new elements.
Selective Breeding	An artificial process by which only organisms possessing a particular characteristic are allowed to breed and produce offspring with that trait.
Substance	The class of homogeneous matter made up of elements and compounds.
Superimpose	To place or lay over or above something.
Tectonic	Relates to the action of forces that cause deformities in the Earth's crust.
Theory	An explanation or model based on observation, experimentation, and reasoning; especially one that has been tested and confirmed as a general principle helping to explain and predict natural events.
Viral Disease	Diseases caused by viruses including AIDS, rabies, measles, polio, chicken pox, and the common cold.
Virus	Any of a large group of disease-producing agents that are smaller than bacteria, are composed of DNA and an outer core of protein, and are dependent upon living cells for their reproduction and growth.

SE

Science Performance Level Descriptors
Physical Science
Grade 2

Content Standard 1.0	**Forces and Motion:** Students understand that forces such as gravitational, electrical, and magnetic influence the motion of objects.
EXCEEDS STANDARD	Demonstrate that objects can move faster or slower than other objects. Create own constructions using such tools as interlocking blocks and erector sets.
MEETS STANDARD	Demonstrate or model objects moving at different speeds (e.g., car speeds up or slows down, one person runs faster than another). Using a model or pattern, demonstrate independently putting together and taking apart a structure (e.g., interlocking block tower, erector set crane, pattern block picture).
APPROACHES STANDARD	Demonstrate that objects move, but have difficulty predicting or describing motion. Accurately follow a pattern, with teacher support, using such tools as interlocking blocks and erector sets (e.g., use three pattern blocks to create a hexagon, build a tower with five interlocking blocks).
BELOW STANDARD	Inaccurately demonstrate the movement of an object. Have difficulty constructing, even with a model or pattern and teacher support.

Science Performance Level Descriptors
Physical Science
Grade 2

Content Standard 2.0	**Structure and Properties of Matter:** Students understand that materials have distinct properties which depend on the amount of matter present, its chemical composition, and structure.
EXCEEDS STANDARD	• Sort and describe objects in terms of a wide variety of observable properties and state reasons for the categories. • Create larger objects from smaller objects so that they have symmetry (e.g., pattern blocks, symmetrical gumdrop structures).
MEETS STANDARD	• Sort and describe objects in terms of some observable properties (e.g., color, shape, size, texture). • Independently form large objects from smaller objects (e.g., put together a puzzle or quilt).
APPROACHES STANDARD	• Describe objects qualitatively in terms of a limited number of observable properties. • Form larger objects from smaller objects, with teacher support.
BELOW STANDARD	• Inadequately describe objects in terms of observable properties. • Have difficulty forming larger objects from smaller objects, even with teacher support.

Science Performance Level Descriptors
Physical Science
Grade 2

Content Standard 3.0	**Energy and Matter: Interactions and Forms:** Students understand that changes in temperature and pressure can alter states of matter. Energy exists in many forms, and one form can change into another.
EXCEEDS STANDARD	• Predict whether a variety of objects will be cold, cool, warm, or hot and verify predictions; observe and record the temperatures of similar objects in different outdoor locations and explain that heat from the sun warms the objects. • Investigate and record changes in observable properties when substances change state. Observe and record what happens when water is placed in a variety of open and closed containers. • Build an instrument to produce sound and classify the sound in terms of pitch and tone compare how sound travels through solids, liquids, and air.
MEETS STANDARD	• Describe a variety of objects as being cold, cool, warm, or hot; describe the temperatures of similar objects in different outdoor locations and explain that heat from the sun warms the objects. • Describe an object before and after change of state in terms of observable properties. • Independently manipulate appropriate objects to produce various sounds by vibrating them; classify the sounds produced in terms of properties of pitch and tone.
APPROACHES STANDARD	• Do not consistently and accurately use the descriptors cold, cool, warm, or hot. • Recognize a change of state but have difficulty describing before and after characteristics. • Need teacher assistance to manipulate appropriate objects to produce sound and need teacher assistance in describing sounds in terms of pitch and tone.
BELOW STANDARD	• Are unable to distinguish large differences in temperature. • Recognize that a change has occurred, but do not relate it to the fact that the same matter can exist as a solid, liquid, or gas. • Do not identify sound as being caused by vibrations.

Science Performance Level Descriptors
Life Science
Grade 2

Content Standard 6.0	**Structure and Function** Students understand that all life forms, at all levels of organization, use specialized structures and similar processes to meet life's needs.:
EXCEEDS STANDARD	• Consistently provide detailed and correct examples of how living things grow and change. • Classify correctly, a wide variety of living things according to established criteria.
MEETS STANDARD	• Provide examples of how living things grow and change, with some minor errors in detail. • Classify living and non-living things according to established criteria, with few errors.
APPROACHES STANDARD	• Give examples of how things grow and change, with some assistance. • Classify a limited number of living and non-living things according to established criteria, with assistance.
BELOW STANDARD	• Provide inaccurate or incomplete examples of how things grow and change. • Are unable to classify things as living or non-living, without major errors.

Science Performance Level Descriptors
Life Science
Grade 2

Content Standard 7.0	**Internal and External Influences on Organisms:** Students understand that organisms respond to internal and external influences.
EXCEEDS STANDARD	- Give examples of diseases caused by germs, and explain different ways they are spread and how the spread can be prevented.
MEETS STANDARD	- Can explain that germs cause some diseases and may be spread by people who have them, explain that washing one's hands thoroughly with soap and water reduces the number of germs and their spread.
APPROACHES STANDARD	- Can with some assistance make the connection between germs and disease and the ways germs are spread.
BELOW STANDARD	- Do not make connections between germs and diseases and the ways germs are spread.

Science Performance Level Descriptors
Life Science
Grade 2

Content Standard 8.0	**Heredity and Diversity:** Students understand that life forms are diverse, and that they pass some characteristics to their offspring.
EXCEEDS STANDARD	• Explain that animals always give birth to offspring that are like themselves. • Sort a group of living things according to various, observable characters and justify each sort.
MEETS STANDARD	• Describe, using common examples, that animals produce offspring that are like themselves (e.g., dogs produce puppies, not kittens). • Sort a group of living things and describe how some living things have similar observable characteristics (e.g., give rational justification of the sort).
APPROACHES STANDARD	• Make mistakes in matching common animals and their offspring. • Have inconsistent success in sorting a group by similar observable characteristics.
BELOW STANDARD	• Are not able to state with certainty that animals produce offspring like themselves. • Are unable to sort by similar characteristics, without support.

Performance Level Descriptors
Earth and Space Sciences
Grade 2

Content Standard 10.0	**Earth Structures and Composition:** Students understand that the Earth is composed of interrelated systems of rocks, water, air, and life.
EXCEEDS STANDARD	• Group rock samples according to multiple attributes of shape, size, color, texture, and patterns of color or shading, and justify the reasons for their grouping.
MEETS STANDARD	• Group rock samples according to a single attribute of shape, size, color, texture, or patterns of color or shading, and justify the reasons for their grouping.
APPROACHES STANDARD	• Can group rock samples according to a single attribute of shape, size, color, texture, or patterns of color or shading, but is unable to justify the reasons for the grouping(s).
BELOW STANDARD	• Are unable to group rock samples according to individual attributes.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 2

Content Standard 12.0	Earth History: **Students understand that Earth systems (such as weather and mountain formation) may change or vary.**
EXCEEDS STANDARD	• Observe, record, and describe sequences of changes that take place in nature.
MEETS STANDARD	• Observe and describe changes that take place in nature (e.g., weather, seasons, day and night).
APPROACHES STANDARD	• Make observations and descriptions that are missing some details.
BELOW STANDARD	• Make observations and descriptions that lack key details.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 2

Content Standard 13.0	**Cycles of Matter and Energy:** Students understand that Earth systems have a variety of cycles through which energy and matter continuously flow.
EXCEEDS STANDARD	• Compare and contrast measurements of temperature in sunny and shaded areas. • Compare and contrast local weather to weather in another location throughout the year.
MEETS STANDARD	• Observe and describe the way ground, water, and air feel in the shade versus the sunlight. • Observe and describe how weather changes (including temperature, cloudiness, precipitation) from day to day and throughout the year.
APPROACHES STANDARD	• Make accurate, but incomplete, observations of differences in the way ground, water, and air feel in shade versus sunlight. • Observe and describe how weather changes from day to day and throughout the year, but omit some significant details.
BELOW STANDARD	• Make inaccurate and incomplete observations of differences in the way ground, water, and air feel in shade versus sunlight. • Observe and describe how weather changes, but do so inaccurately and incompletely.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 2

Content Standard 14.0	**Earth and Space Sciences:** Students understand that the Earth is part of a planetary system within the Milky Way galaxy, which is part of the known universe.
EXCEEDS STANDARD	• Identify the sun, moon, and the Earth as components of our solar system. • Describe the appearance of the different phases of the moon, without attempting to explain the reason for the appearance.
MEETS STANDARD	• Identify, from drawings or photographs, the sun, the moon, and stars; identify, from drawings, photographs, or verbal prompts, that the Earth is a planet. • Describe the movement of the sun across the sky, and tell that the moon appears in different places at different times.
APPROACHES STANDARD	• Identify, with few errors, the sun, the moon, and stars and the Earth as a planet. • Describe the movement of the sun across the sky with few incorrect details, and inconsistently tell that the moon appears in different places at different times.
BELOW STANDARD	• Identify incorrectly the sun, the moon, and stars and fail to identify the Earth as a planet. • Describe with little success the movement of the sun across the sky, and do not tell that the moon appears in different places at different times.

Science Performance Level Descriptors
Environmental Sciences
Grade 2

Content Standard 15.0	Ecosystems: Students will demonstrate an understanding that ecosystems display patterns of organization, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.
EXCEEDS STANDARD	• Describe how animals depend upon plants, other animals, and other Earth resources for food, water, and shelter. • Provide detailed, significant examples of interactions between plants and animals.
MEETS STANDARD	• Investigate, observe, and discuss the interactions between plants as producers and animals as consumers. • Provide examples of interdependence between plants and animals.
APPROACHES STANDARD	• Participate in group investigations but can make little or no application to plants as having the role of being food for the animals that consume them. • Provide few or weak examples of interdependence between plants and animals.
BELOW STANDARD	• Recognize that animals and plants are separate categories but do not recognize their interdependence. • Are unable to provide examples of interactions between plants and animals.

Science Performance Level Descriptors
Environmental Sciences
Grade 2

Content Standard 16.0	**Natural Resources:** Students demonstrate and understand that natural resources include renewable and non-renewable materials and energy. All organisms, including human, use resources to maintain and improve their existence, and the use of resources can have positive and negative consequences.
EXCEEDS STANDARD	• Classify samples of materials as reusable or nonreusable, and give reasons for their classifications. • Describe how and where humans obtain various natural resources.
MEETS STANDARD	• Demonstrate how some resources can be used and reused (e.g., use waste paper to make new paper, recycle glass). • Describe the various resources that provide the necessary things used by people in their daily lives.
APPROACHES STANDARD	• Do not distinguish clearly between those resources which can be used and reused and those which cannot. • Identify a few of the various resources that provide the necessary things used by people in their daily lives.
BELOW STANDARD	• Are unable to describe how some resources can be used and reused. • Are unable to identify the various resources that provide the necessary things used by people in their daily lives; confuse "want" and "need."

Science Performance Level Descriptors
Environmental Sciences
Grade 2

Content Standard 17.0	Conservation: **Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole, and future generations.**
EXCEEDS STANDARD	• Give rich details in illustrations of how people live in different places in different ways. • Illustrate something that stays the same in their lives and how they accommodate something that changes.
MEETS STANDARD	• Illustrate how people live in different places in different ways. • Illustrate how some things change in their daily lives and some things stay the same.
APPROACHES STANDARD	• Illustrate but fail to include necessary details of how people live in different places in different ways. • Identify something that changes in their daily lives and something that stays the same.
BELOW STANDARD	• Illustrate how people live in different places in different ways, but essential comparisons are inaccurate or incomplete. • Require teacher support to identify something that changes in their daily lives and something that stays the same.

Science Performance Level Descriptors
Processes and Skills
Grade 2

Content Standard 18.0	**Scientific, Historical, and Technological Perspectives:** Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole, and future generations. (Nature of Science, Attributes of Scientific Research, The History of Science and Invention, Technology, The Dynamic Character of Scientific Knowledge, Scientific Ethics)
EXCEEDS STANDARD	• Generate an idea or an invention independently, and provide multiple **some** examples of thinkers and inventors from around the world.
MEETS STANDARD	• Generate an idea or invention with prompting, and provide some examples of thinkers and inventors from around the world.
APPROACHES STANDARD	• Are reluctant to suggest ideas; state that everybody can come up with ideas and inventions but do not provide examples.
BELOW STANDARD	• Do not believe or cannot explain that everyone can come up with ideas or inventions.

Science Performance Level Descriptors
Processes and Skills
Grade 2

Content Standard 21.0	Scientific Values and Attitudes: **Students understand that science is an active process of systematically examining the natural world.**
EXCEEDS STANDARD	• Make qualitative and quantitative observations and provide descriptions using words, numbers, and drawings. • Independently record observations of investigations over time in a notebook or journal.
MEETS STANDARD	• Make qualitative observations and provide pictorial or word descriptions of objects or phenomenon. • Record observations of investigations over time in a notebook or journal with minimal assistance (e.g., growth of a plant, changes in weather, insect growth and development).
APPROACHES STANDARD	• Observe but provide inaccurate or incomplete descriptions. • Record, with some errors, observations of investigations over time in a notebook or journal.
BELOW STANDARD	• Have little success in observing and providing descriptions. • Have little success in recording observations of investigations over time in a notebook or journal.

Science Performance Level Descriptors
Processes and Skills
Grade 2

Content Standard 22.0	Communication Skills: **Students understand that a variety of communication methods can be used to share scientific information.**
EXCEEDS STANDARD	• Consistently follow verbal and written instructions accurately. • Consistently produce simple pictographs to describe observations. • Provide leadership to a cooperative group and consistently contribute ideas within a group.
MEETS STANDARD	• Generally follow verbal and written instructions accurately. • Generally produce simple pictographs to describe observations. • Cooperate and contribute ideas within a group.
APPROACHES STANDARD	• Often misinterpret verbal and written instructions. • Occasionally produce simple pictographs to describe observations. • Usually cooperate but contribute ideas within a group reluctantly.
BELOW STANDARD	• Seldom follow verbal and written instructions accurately. • Can produce simple pictographs to describe observations, only with sustained teacher support. • Cooperate and contribute ideas within a group, only with teacher supervision.

Science Performance Level Descriptors
Processes and Skills
Grade 2

Content Standard 23.0	Scientific Applications of Mathematics: **Students understand that scientific inquiry is enhanced and often communicated by using mathematics.**
EXCEEDS STANDARD	• Use mental computation to readily make estimates that are very close to the correct value. • Identify unexpected or unusual results in activities, when counting or measuring using standard or non-standard units.
MEETS STANDARD	• Generally use mental computation to make rough estimates (e.g., simple addition and subtraction problems). • Adequately identify unexpected or unusual results in activities, when counting or measuring using non-standard units (e.g., measuring classroom chairs with "handspans" and with rulers).
APPROACHES STANDARD	• Need practice using mental computation to make rough estimates. • Attempt to identify unexpected or unusual results in activities, when counting or measuring using non-standard or standard units with limited success.
BELOW STANDARD	• Are reluctant to use mental computation to estimate and/or when they do so, estimated values are far from the acceptable range. • Have little or no success identifying unexpected or unusual results in activities, when counting or measuring using non-standard or standard units.

Science Performance Level Descriptors
Processes and Skills
Grade 2

Content Standard 24.0	Laboratory Skills and Safety: **Students can appropriately and safely apply the tools and techniques of scientific inquiry.**
EXCEEDS STANDARD	• Consistently keep accurate, orderly records of observations and measurements taken over time.
MEETS STANDARD	• Generally keep accurate records of observations and measurements taken over time (e.g., plant growth, metamorphosis, evaporation, weather conditions).
APPROACHES STANDARD	• Attempt to keep a record of observations and measurements taken over time but records are inaccurate and/or have missing entries.
BELOW STANDARD	• Do not keep records of observations and measurements that are able to be used.

Science Performance Level Descriptors
Physical Science
Grade 3

Content Standard 1.0	**Forces and Motion:** Students understand that forces such as gravitational, electrical, and magnetic influence the motion of objects.
EXCEEDS STANDARD	• Model a change in motion involving a change in speed, a change in direction, and a change in both speed and direction and that objects are more difficult to start and to stop moving when they have mass added to them. • Create different objects that are balanced and explain the situations by describing the point of balance (e.g., use a "see saw", balance unequal weights). • Use appropriate tools to creatively construct, (e.g., model soapbox derby car, model fort, model volcano).
MEETS STANDARD	• Demonstrate that a given push or pull (hard or soft) causes an object to change its speed (faster or slower) and/or direction. • Predict whether or not an object will topple or balance. • Effectively manipulate simple tools (e.g., hammer and nails, screwdriver and screws, nuts and bolts) and demonstrate when to use specific tools.
APPROACHES STANDARD	• Demonstrate that a push or pull causes an object to change its motion. • Demonstrate when an object is balanced but do not explain completely. • Are unsure of when to use simple tools or have difficulty manipulating them in construction(s).
BELOW STANDARD	• Fail to demonstrate that a push or pull causes an object to change its motion. • Are unable to set up an example of a balanced object. • Are unsure of how to use simple tools.

Science Performance Level Descriptors
Physical Science
Grade 3

Content Standard 2.0	Structure and Properties of Matter: **Students understand that materials have distinct properties which depend on the amount of matter present, its chemical composition, and structure.**
EXCEEDS STANDARD	• Describe objects in terms of a wide range of observable properties using measurements where possible (e.g., texture, geometric shape, length, volume, luster, state of matter). • Sort objects by multiple observable characteristics or attributes (e.g., dimensions, coloration, symmetry, parts, state of matter) using Venn diagrams or other classification schemes; identify or create a classification system from observing objects that are already grouped; explain reasons for creating categories.
MEETS STANDARD	• Describe objects in terms of observable properties (e.g., color, texture, size, state of matter, symmetry). • Sort objects on the basis of two or more observable characteristics or attributes (e.g., dimensions, coloration, symmetry, parts, state of matter) using Venn diagrams or other schemes; identify or create a classification system from observing objects that are already grouped.
APPROACHES STANDARD	• Describe objects in terms of some observable properties (e.g., color, texture, size, state of matter). • Sort and classify objects, organisms, or phenomena into two general groups in terms of observable properties (e.g., coloration, symmetry, size).
BELOW STANDARD	• Inaccurately describe objects in terms of some observable properties. • Are unable to sort and classify objects, organisms, or phenomena into general groups in terms of observable properties.

Science Performance Level Descriptors
Physical Science
Grade 3

Content Standard 3.0	Energy and Matter: Interactions and Forms: **Students understand that changes in temperature and pressure can alter states of matter. Energy exists in many forms, and one form can change into another.**
EXCEEDS STANDARD	• Measure, record, and graph changes in temperature indoors and outdoors for one week; explain patterns that appear; describe different kinds of common thermometers and the kinds of situations they are used in. • Predict changes in the state of matter and state reasons (e.g., solid ice melts into liquid when placed in a warm environment).
MEETS STANDARD	• Use a thermometer to measure and record a range of temperatures; label each as hot, warm, cool, or cold. • Investigate, using direct observations, and describe in detail how a solid changes into a liquid, and water evaporates if left in an open container.
APPROACHES STANDARD	• Can generally read temperature on a thermometer, but inaccurately characterize it as hot or cold. • Can adequately describe processes that take place in the change of state of matter, but provide little detail in observable properties.
BELOW STANDARD	• Have difficulty reading and relating the temperature on a thermometer to degrees of heat. • Are unable to describe the process of a substance changing state or changes in properties that accompany the change in state.

Science Performance Level Descriptors
Life Science
Grade 3

Content Standard 6.0	Structure and Function: Students understand that all life forms, at all levels of organization, use specialized structures and similar processes to meet life's needs.
EXCEEDS STANDARD	• Observe and accurately describe the growth of a plant over time and explain that plants have a life cycle that includes seed germination, development, and reproduction; observe and accurately describe the life cycle of a domestic animal and an animal that undergoes metamorphosis; relate the stages in the organism's development to its need for water, air, space, food. • Independently and correctly classify plants and animals representative of major categories on the basis of identifiable structures.
MEETS STANDARD	• Observe and describe the growth of a plant (e.g., a bean plant) over time and identify plant growth patterns (e.g., sprouting of seeds, formation of roots, leaves, and stems, development of flowers and seeds); observe and describe the life cycle of a domestic animal and an animal that undergoes metamorphosis (e.g., a frog, butterfly, or mealworm); describe the needs of living organisms. • Classify plants and animals representative of major groups (e.g., evergreen vs. deciduous trees, animals with an external, internal or no skeleton, etc., with few errors.
APPROACHES STANDARD	• Provides incomplete and erroneous descriptions of life cycles of plants and animals and their need for food, water, air, etc. • Require assistance to classify plants and animals according to identifiable structures.
BELOW STANDARD	• Are unable to describe key stages in the life cycles of plants and animals life and their need for food, air, water, etc., with strong teacher support. • Are unable to classify plants and animals.

Science Performance Level Descriptors
Life Science
Grade 3

Content Standard 7.0	Internal and External Influences on Organisms: **Students understand that organisms respond to internal and external influences.**
EXCEEDS STANDARD	• Investigate and describe and give examples of how various living things behave differently under differing conditions with a high degree of accuracy. • Explain clearly, with examples, how germs affect the functions of the body, that different diseases may cause identical symptoms, and describe how the defenses that humans have against germs work.
MEETS STANDARD	• Describe and give with examples of how various living things behave differently under differing conditions (e.g., migration, coloration, hibernation) with minimal errors. • Explain that germs affect the functions of the body and identify defenses that the human body has against germs (e.g., saliva, skin, special blood cells).
APPROACHES STANDARD	• Can provide a limited description of how various living things behave differently under differing conditions. • Have difficulty describing the effects of germs and the human body's defense against defending them. • Recognize that germs affect the functions of the body.
BELOW STANDARD	• Provide a description of how various living things behave differently under differing conditions that includes major misconceptions. • Give an inaccurate explanation of how germs affect the functions of the body.

Science Performance Level Descriptors
Life Science
Grade 3

Content Standard 8.0	Heredity and Diversity: **Students understand that life forms are diverse, and that they pass some characteristics to their offspring.**
EXCEEDS STANDARD	• Describe, using examples, how the young of a species resemble their parents and how they are different, describe how siblings may resemble each other. • Independently sort a group of living things by appearance and behavior and give rational justification of the sort.
MEETS STANDARD	• Give examples of how offspring may resemble parents and other siblings. • Sort a group of living things by appearance and behavior and give rational justification of the sort with minimal help.
APPROACHES STANDARD	• Need assistance to give examples of how offspring may resemble parents and other siblings. • Sort a group of living things by appearance and behavior but require substantial help to justify the basis of the sort.
BELOW STANDARD	• Do not make the connection of how offspring resemble parents and siblings. • Cannot sort a group of living things by appearance and behavior and cannot give rational justification of the sort.

Science Performance Level Descriptors
Life Science
Grade 3

Content Standard 9.0	Evolution-The Process of Biological Change: **Students understand that life forms change over time.**
EXCEEDS STANDARD	• Illustrate by providing a variety of examples of different kinds of living things within a particular group (e.g., fish, insects, trees, flowering plants). • Provide specific examples of characteristics which allow plants and animals to survive in specific environments, such as how a monkey's tail helps it survive in the rainforest canopy.
MEETS STANDARD	• Illustrate by providing diverse examples of the many different kinds of living things that exists on earth. • Provide general examples of how particular features of plants and animals help them live in different kinds of places (e.g., the thickened stems of cacti enable them to store water and live in the desert).
APPROACHES STANDARD	• Can provide only limited examples of the many different kinds of living things that exist on earth. • Provide limited examples of how particular features of plants and animals help them live in different kinds of places.
BELOW STANDARD	• Examples of living things are limited to the animal kingdom, other kingdoms are omitted. • Provide examples of specific features that do not relate to the survival of the plant or animal.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 3

Content Standard 10.0	Earth Structures and Composition: Students understand that the Earth is composed of interrelated systems of rocks, water, air, and life.
EXCEEDS STANDARD	• Describe some uses for various Earth materials and some of the places where those materials are found. • Identify landforms and give justifications for their identification by describing features of those landforms. • Compare relative areas of ocean and land on Earth's surface (e.g., laying a grid over a world map and counting squares over land and squares over ocean).
MEETS STANDARD	• Identify, with few or no errors, various samples of Earth materials (e.g., rocks, minerals, soil, sand, gravel, water, ice, air). • Identify landforms (e.g., mountains, valleys). • Describe the shape of the Earth as "round like a ball" (or as a sphere); compare, using maps and models, relative areas of ocean and land on Earth's surface.
APPROACHES STANDARD	• Inconsistently identify various samples of Earth materials. • Inconsistently identify landforms. • Describe the shape of the Earth two-dimensionally (as "a circle"), and attempt to compare relative areas of ocean and land on Earth's surface.
BELOW STANDARD	• Are unable to identify various samples of Earth materials. • Are unable to identify landforms. • Are unable to identify the shape of the Earth and give mostly inaccurate comparisons of land and ocean areas on Earth's surface.

Performance Level Descriptors
Earth and Space Sciences
Grade 3

Content Standard 11.0	**Earth Models:** Students understand that the Earth may be represented by a variety of maps and models.
EXCEEDS STANDARD	• Given a map, identify the directions north, south, east, and west. • Identify specific locations on the state map (state capitol, county seats, lakes, rivers).
MEETS STANDARD	• Indicate any one of three map directions as requested when given the fourth direction in the classroom. • Locate the state of Nevada on a national map and their own city or town on a Nevada state map.
APPROACHES STANDARD	• Inconsistently indicate directions. • Inconsistently locate the state of Nevada and their own city.
BELOW STANDARD	• Are unable to identify directions successfully. • Are unable to locate the state of Nevada and their own city.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 3

Content Standard 12.0	**Earth History:** Students understand that Earth systems (such as weather and mountain formation) may change or vary.
EXCEEDS STANDARD	• Measure and record rates of change of various natural phenomena.
MEETS STANDARD	• Observe and describe, with examples, how some changes are so slow (e.g., the growth of a plant, the movement of an hour hand on a clock) or so fast (e.g., lightning strikes, eye blinks, the change from dark to light when a light is turned on) and that they are hard to see while they happen.
APPROACHES STANDARD	• Have difficulty identifying and describing changes that happen extremely slowly or extremely rapidly.
BELOW STANDARD	• Are unable to identify changes that happen so slowly or so quickly that they are hard to see.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 3

Content Standard 13.0	**Cycles of Matter and Energy:** Students understand that Earth systems have a variety of cycles through which energy and matter continuously flow.
EXCEEDS STANDARD	• Describe the relationship between temperatures and brightnesses of light bulbs of various sizes (wattages). • Observe, record, and describe seasonal differences using words, numbers, and drawings, independently. • Describe properties of liquid water and solid ice; generalize these properties to other examples of liquids and solids.
MEETS STANDARD	• Observe and describe that some objects that give off light (e.g., small light bulbs, the sun) also give off heat. • Observe, record, and describe seasonal differences (e.g., weather, changes in leaves of decidious trees) using words, numbers (e.g., temperatures), and drawings, with minimal assistance. • Observe and describe that water can be a liquid or a solid, and explain that changes in temperature can cause water to go back and forth from one form to another.
APPROACHES STANDARD	• Observe and describe, with some errors, how objects that give off light also give off heat. • Observe, record, and describe seasonal differences using words, numbers, and drawings, with considerable teacher support. • Observe and describe, with some errors, how water can be a liquid or a solid, and explain with limited success that changes in temperature can cause water to go back and forth from one form to another.
BELOW STANDARD	• Observe and describe, with major errors, how objects that give off light also give off heat. • Observe, record, and describe with major confusion, seasonal differences using words, numbers, and drawings. • Are unable to describe how water can be a liquid or a solid, and relate changes in its form to temperature changes.

Performance Level Descriptors
Sciences
Grade 3

Content Standard 14.0	**Earth and Space Science:** Students understand that the Earth is part of a planetary system within the Milky Way galaxy, which is part of the known universe.
EXCEEDS STANDARD	• Identify the sun, moon, planets, asteroids, comets, and Earth as components of our solar system, and give rudimentary descriptions of each. • Identify a constellation from a photograph, drawing, or direct observation.
MEETS STANDARD	• Identify the sun, moon, and the Earth as components of our solar system. • Explain that there are more stars in the sky than anyone could easily count.
APPROACHES STANDARD	• Identify with minimal assistance the sun, moon, and the Earth as components of our solar system. • Explain inconsistently that there are more stars in the sky than anyone could easily count.
BELOW STANDARD	• Identify that the sun, moon, and the Earth as components of our solar system unsuccessfully. • Demonstrate insufficient understanding that there are more stars in the sky than anyone could easily count.

Science Performance Level Descriptors
Environmental Sciences
Grade 3

Content Standard 15.0	**Ecosystems: Students will demonstrate an understanding that ecosystems display patterns of organization, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.**
EXCEEDS STANDARD	• Create a habitat for a simple organism demonstrating how an organism's surroundings provide for its needs. • Design and set up a mini-ecosystem (e.g. a closed terrarium or aquarium) and observe and record the results and changes over time.
MEETS STANDARD	• Identify, using appropriate examples, some similarities and differences found in animals and plants that help them live in their unique habitats. • Describe, using diagrams and/or illustrations, several ways organisms interact with each other.
APPROACHES STANDARD	• Identify some similarities and differences found in animals and plants that help them live in their unique habitats. • Describe several ways organisms interact with each other.
BELOW STANDARD	• Are unable to specify similarities and differences found in animals and plants that help them live in their unique habitats. • Are unable to list important ways organisms interact with each other.

Science Performance Level Descriptors
Environmental Sciences
Grade 3

Content Standard 16.0	**Natural Resources:** Students demonstrate and understand that natural resources include renewable and non-renewable materials and energy. All organisms, including human, use resources to maintain and improve their existence, and the use of resources can have positive and negative consequences.
EXCEEDS STANDARD	• Describe in detail how one natural resource is obtained. • Compare and contrast how people in different cultures obtain and use natural resources.
MEETS STANDARD	• Explain that natural resources are used for many purposes (e.g., trees are used for construction, paper, and fuel); provide multiple examples. • Describe how humans have obtained natural resources for thousands of years through farming, mining, and hunting and gathering.
APPROACHES STANDARD	• Have difficulty identifying examples of natural resources that are used for many purposes. • Describe, without some necessary details, how humans have obtained natural resources for thousands of years through farming, mining, and hunting and gathering.
BELOW STANDARD	• Are not able to explain that natural resources are used for many purposes. • Describe, mostly inaccurately, how humans have obtained natural resources for thousands of years through farming, mining, and hunting and gathering.

Science Performance Level Descriptors
Environmental Sciences
Grade 3

Content Standard 17.0	Conservation: **Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole, and future generations.**
EXCEEDS STANDARD	• Provide a wide variety of examples of materials that can be recycled and used again, some in different forms, and describe how individuals may participate in recycling efforts. • Analyze the components of multiple patterns, and make reasonable predictions of the continuation of the patterns.
MEETS STANDARD	• Provide examples of materials that can be recycled and used again, including some in different forms. • Make a reasonable prediction of a pattern's continuation based on a given pattern of observable change.
APPROACHES STANDARD	• Give only a few examples of materials that can be recycled and used again. • Can identify the pattern of observable change, but make unreasonable predictions of its continuation.
BELOW STANDARD	• Cannot connect the change of materials into different forms for reuse. • Cannot recognize a given pattern of observable change sufficiently to make a prediction.

Science Performance Level Descriptors
Processes and Skills
Grade 3

Content Standard 18.0	Scientific, Historical, and Technological Perspectives: **Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole, and future generations. (Nature of Science, Attributes of Scientific Research, The History of Science and Invention, Technology, The Dynamic Character of Scientific Knowledge, Scientific Ethics)**
EXCEEDS STANDARD	• Make observations, ask questions, and seek answers independently. • Record accurate and thoughtful observations, and routinely compare their results with others. • Describe that men and women of all ages and backgrounds make contributions to various scientific fields. • Evaluate the benefits of being part of a team after participating in a group project. • Skillfully use tools to build a device which can be used in making a task easier.
MEETS STANDARD	• Make observations, ask questions, and seek answers with teacher support. • Generally observe, and record accurately in order to compare findings with others. • Identify that women and men of all different ages and backgrounds make contributions to science. • Identify benefits of working with a team and sharing findings. • Competently use tools (e.g., hammer, screwdrivers, balances, hand lens, pencil sharpener, and lever) to make a task easier.
APPROACHES STANDARD	• Make incomplete or inaccurate observations, ask questions reluctantly, but show interest in learning about the natural world. • Make errors in observation and record keeping. • Attempt to identify roles of men and women in various scientific fields. Are uncertain that women and men of different ages and backgrounds make contributions to science. • Can identify few benefits of being part of a team after participation in a group project. • Ineffectively use tools to build a device which can be used in making a task easier.
BELOW STANDARD	• Have little success in making observations and asking questions; show little interest in learning about the natural world. • Have little success observing and recording findings and comparing with others. • View science as a field in which only certain people make contributions. • Do not contribute to the evaluation of being part of a team after participation in a group project. • Have little success using tools to build a device which can be used in making a task easier.

Science Performance Level Descriptors
Processes and Skills
Grade 3

ontent Standard 20.0	**Systems, Models, Risk and Predictions:** Students understand that a variety of models can be used to describe or predict things and events.
EXCEEDS STANDARD	• Compare and contrast several models with what they represent describing similarities and differences, using supporting diagrams. • Identify and represent simple patterns and correctly predict future events in the pattern. Detect patterns in nature based on personal observation. • Demonstrate, with several examples, that when parts are joined, they can do things together they could not have done independently.
MEETS STANDARD	• Compare and contrast a model with what it represents. • Identify and represent observable patterns and correctly predict the next likely event based on the pattern (e.g., life cycles, seasonal weather changes, phases of the moon). • Demonstrate, with an example, that when parts or substances are joined or mixed, they can do things together they could not have done by themselves (e.g., bread and its ingredients, a working model car and its parts).
APPROACHES STANDARD	• Make a simple drawing to represent a real object (e.g., a map of their room). • Identify and describe simple patterns but have difficulty representing sequences and predicting the next likely event based on the pattern. • Can describe that when parts are put together, they can do things together they could not have done by themselves but cannot give appropriate examples.
BELOW STANDARD	• Are unable to compare and contrast a model with what it represents. • Occasionally identify a simple pattern, but cannot predict the next likely event in the pattern. Can detect patterns based on personal observations. • Have little success in describing or demonstrating that when parts are put together, they can do things together they could not have done by themselves.

Science Performance Level Descriptors
Processes and Skills
Grade 3

Content Standard 21.0	Scientific Values and Attitudes: **Students understand that science is an active process of systematically examining the natural world.**
EXCEEDS STANDARD	• Observe and raise thoughtful questions about the world. Develop questions based on one or more observations, and using tables or bar graphs to help identify patterns, independently seek answers through investigations. • Accurately record observations of investigations over time in a notebook or journal (e.g., changes in an aquarium or terrarium, evaporation).
MEETS STANDARD	• Observe and raise questions about the world and seek answers through investigations (e.g., the actions of toys, development and characteristics of schoolyard plants). • Record observations of investigations over time in a notebook or journal (e.g., changes in a terrarium, in a tadpole as it matures).
APPROACHES STANDARD	• Make observations, when directed, but seldom raise questions about the world or seek answers through investigations. • Occasionally record observations of investigations over time in a notebook or journal.
BELOW STANDARD	• Make inaccurate observations and show little interest in learning about the natural world. • Observations, when recorded in a notebook or journal, are difficult to follow.

Science Performance Level Descriptors
Processes and Skills
Grade 3

Content Standard 22.0	**Communication Skills:** Students understand that a variety of communication methods can be used to share scientific information
EXCEEDS STANDARD	• Accurately follow verbal and written instructions to complete a procedure. • Create clear illustrations, graphs, and charts to convey ideas and record observations. • Consistently cooperate and contribute ideas within a group.
MEETS STANDARD	• Generally follow verbal and written instructions to complete a procedure. • Create adequate illustrations, graphs, and charts to convey ideas and record observations that are generally easy to understand. • Generally cooperate and contribute ideas within a group.
APPROACHES STANDARD	• Have difficulty in following verbal and written instructions to complete a procedure. • Create illustrations, graphs, and charts to convey ideas and record observations that are often confusing. • Occasionally cooperate and contribute ideas within a group.
BELOW STANDARD	• Follow verbal and written instructions to complete a procedure only with sustained teacher support. • Create illustrations, graphs, and charts to convey ideas and record observations, only with sustained teacher support. • Seldom cooperate and contribute ideas within a group.

Science Performance Level Descriptors
Processes and Skills
Grade 3

Content Standard 23.0	Scientific Applications of Mathematics: **Students understand that scientific inquiry is enhanced and often communicated by using mathematics.**
EXCEEDS STANDARD	• Use mental computation to readily make estimates that are very close to the correct value. • Determine whether measurements and descriptions are reasonably accurate; verify the reasonableness of results by checking measurements against "known" values; explain what a scale drawing is, using an example.
MEETS STANDARD	• Generally use mental computation to make rough estimates (e.g., addition, subtraction, multiplication, division, measurement problems). • Determine whether measurements and descriptions are reasonably accurate (i.e., compare objects by measuring their lengths, weights, and capacities; verify the reasonableness of their results by checking their measurements against "known" values (e.g., length of classroom, quart of milk).
APPROACHES STANDARD	• Need practice in using mental computation to make rough estimates. • Attempt to determine whether measurements and descriptions are reasonably accurate, but, their measurements are often inaccurate and they are unsure of how to go about verifying the reasonableness of a measurement.
BELOW STANDARD	• Are reluctant to use mental computation to estimate. • Have limited success in determining whether measurements and descriptions are reasonably accurate.

Science Performance Level Descriptors
Processes and Skills
Grade 3

Content Standard 24.0	Laboratory Skills and Safety: **Students can appropriately and safely apply the tools and techniques of scientific inquiry.**
EXCEEDS STANDARD	• Consistently use equipment properly and safely in all science activities and help other students to do so. • Consistently identify and gather tools and materials needed in an investigation.
MEETS STANDARD	• Consistently use equipment properly and safely in all science activities. • Identify and gather tools and materials needed in an investigation.
APPROACHES STANDARD	• Attempt to use equipment properly and safely in all science activities. • Attempt to identify and gather tools and materials needed in an investigation.
BELOW STANDARD	• Do not know how to use equipment properly and sometimes act in an unsafe manner when engaged in science activities. • Are unsure of which tools and materials are needed in an investigation.

Science Performance Level Descriptors
Physical Science
Grade 5

Content Standard 1.0	**Forces and Motion:** Students understand that forces such as gravitational, electrical, and magnetic influence the motion of objects.
EXCEEDS STANDARD	• Accurately predict the change in motion that will result from a particular push or pull on an object. • Investigate the behavior of objects moving on ramps or being released in the air, observing and recording data, and explain how gravity affects the motion of those objects. • Explain the mechanics of objects moving in a variety of different ways (e.g., round things roll and flat objects slide). • Create an object that is buoyant in water (e.g., aluminum or clay boat). • Demonstrate the ability of magnets to attract certain materials, without touching them and that like magnetic poles repel.
MEETS STANDARD	• Demonstrate and describe that the greater the push or pull on an object, the greater the change in motion of that object. • Give examples of falling objects and explain that a force (gravity) is pulling them down. • Categorize objects that move in different directions (e.g., forward and back and sideways), in a variety of ways (e.g., rotating, rolling, or revolving) and with varying ease of movement (friction). • Can accurately predict which objects will sink or float in air or water and can classify them on the basis of this behavior. • Predict, sort, and classify objects and materials that magnets attract; demonstrate and describe that like magnetic poles repel.
APPROACHES STANDARD	• Can state that there is a relationship between a push or a pull and the resulting motion. • Can describe what happens when an object is released on a ramp or in the air but cannot explain that gravity is the force pulling on the object. • Can sometimes describe the movement of objects in a variety of ways. • Can sort objects that sink or float, but cannot predict whether they sink or float. • Can sort and classify objects and materials that magnets attract, but cannot accurately predict which materials the magnet will attract.
BELOW STANDARD	• Do not detect a relationship between a push or a pull and the resulting motion. • Cannot accurately describe the movement of an object falling in the air or moving down a ramp. • Give inaccurate descriptions for the movement of objects. • Have difficulty sorting and classifying sinking and floating objects. • Inaccurately sort and classify objects and materials that magnets attract.

Science Performance Level Descriptors
Physical Science
Grade 5

Content Standard 2.0	Structure and Properties of Matter: **Students understand that materials have distinct properties which depend on the amount of matter present, its chemical composition, and structure.**
EXCEEDS STANDARD	• Explain common techniques useful for separating the components of mixtures based on their properties, and apply one or more to physically recover the components. • Classify and describe matter, comparing and contrasting elements, compounds, and mixtures; giving multiple examples of each. Use a simple model to explain observed properties of matter. • Use specific geometric terms in describing the crystalline patterns formed after water has evaporated from solutions of various soluble solids (e.g., cubic salt crystals and octahedral alum crystals). • Identify and demonstrate ways that a substance can be broken down physically into smaller pieces and still retain its same properties. • Describe observable properties of a wide range of common materials and relate the properties to the way in which the material is actually used.
MEETS STANDARD	• Separate the components of a mixture based on their properties when provided with directions (e.g., recovering sand and sugar from a mixture of the two or recovering sugar from a water solution) and describe why the technique worked. • Compare and contrast elements, compounds, and mixtures. Give common examples of elements, compounds, and mixtures. • Investigate and describe that patterns of crystals are formed after water has evaporated from a solution. • Describe the properties of large and small pieces of a material and explain that the properties are the same (e.g., a sheet of paper versus pieces of paper, chunk of rock and a fragment, cinnamon stick and powdered cinnamon). • Describe the observable properties (e.g., state of matter, ductility, malleability, color, strength, shape, etc.) of various materials and suggest uses for them based on their properties. Compare and contrast the properties and composition of various materials.
APPROACHES STANDARD	• Are unable to successfully separate the components of a mixture even with detailed directions and/or describe differences in physical properties which make separation of components possible. • Have difficulty defining or giving correct examples of elements, compounds, and mixtures. • Inconsistently identify the patterns of crystals formed after water has evaporated from solutions of various soluble solids. • Inaccurately describe the physical properties of large and small pieces or are unable to explain that making smaller pieces from large ones does not change their properties • Identify obvious properties, but descriptions and comparisons lack necessary detail.

Physical Science
Grade 5 (Content 2.0 continued)

BELOW STANDARD	• Are unable to separate the components of a mixture and describe pertinent properties. • Cannot define or give examples of elements, compounds, and mixtures. • Are unable to discern and describe differences in the patterns of crystals formed after water has evaporated from solutions of various soluble solids. • Are unable to describe that the properties of large and small pieces of a material are the same. • Have difficulty identifying and describing obvious properties of materials.

Science Performance Level Descriptors
Physical Science
Grade 5

Content Standard 3.0	Energy and Matter: Interactions and Forms: **Students understand that changes in temperature and pressure can alter states of matter. Energy exists in many forms, and one form can change into another.**
EXCEEDS STANDARD	• Predict what happens when warm objects meet cold objects and design a demonstration that shows warm objects cool and cool objects warm when placed together (e.g., mixing hot and cold water). • Research and explain, with supporting diagrams, how matter and energy interact in the water cycle and the rock cycle and how these cycles affect the surface of the earth; use and cite multiple resources. • Build simple instruments and demonstrate the relationship between the volume of vibrating air and the pitch. • Independently build and diagram an electrical circuit (parallel or series) using components such as switches, wires, batteries, sockets, motor, and lights and describe their functions.
MEETS STANDARD	• Gather data to describe the cooling of warm objects and the warming of cool objects when brought together. Make accurate observations. • Investigate how energy and matter interact when water changes phases from solid to liquid to gas and vice versa; relate these interactions to and diagram the water cycle, indicating whether energy is absorbed or released in each phase change. • Demonstrate how changes in sound can be made given appropriate supplies such as a uniform set of eight glasses or test tubes, a metal spoon, chopstick and a container of water; record and summarize the findings. • Follow instructions to build a simple series electrical circuit and describe the use of various components (e.g., switches, wires, batteries, sockets, motor, and lights).
APPROACHES STANDARD	• Are able to describe the cooling of warm objects and the warming of cool objects, when brought together with teacher support. • Are able to describe that how energy effects phase changes, but have difficulty in relating energy to phase changes in the water cycle. • Manipulate instruments to produce sound but are unable to discern patterns in the vibrations and sounds. • Follow instructions to build a circuit but inadequately explain the function of various components.
BELOW STANDARD	• Are unable to discern what happens when warm objects and cool objects are brought together. • Are unable to describe how the use of energy effects a change of state and/or describe the water cycle. • Manipulate instruments to make sounds, but do not explain the relationship between vibrations and sounds. • Are unsuccessful in building an electrical circuit.

Science Performance Level Descriptors
Physical Science
Grade 5

Content Standard 4.0	**Chemical Reaction:** Students understand that chemical reactions change substances into different substances.
EXCEEDS STANDARD	• Design and carry out, with teacher approval, demonstrations to show changes in materials when they are heated or mixed and describe resulting changes in those materials; indicate those changes where a new material with new and different properties has been formed.
MEETS STANDARD	• Observe and record the effects of common physical and chemical changes (e.g., melting and burning candle wax, dissolving sugar in water, heating sugar, mixing baking soda with vinegar, baking a cake); distinguish between a phase and a chemical change.
APPROACHES STANDARD	• Can identify some simple physical and chemical changes, but descriptions are incomplete or inaccurate.
BELOW STANDARD	• Confuse phase and chemical changes.

Science Performance Level Descriptors
Life Science
Grade 5

Content Standard 6.0	Life Science: Students understand that all life forms, at all levels of organization, use specialized structures and similar processes to meet life's needs.
EXCEEDS STANDARD	• Observe, draw, label, and compare and contrast the life cycles of representative plants and animals including birth or germination, development, reproduction, and death. • Independently classify structures from various organisms according to their function; explain that in classifying organisms biologists consider internal and external structure to be more significant than general appearance or behavior. • Design, and depict in detail, an animal and a plant for specific habitats, demonstrating an understanding of the relationships between the habitat of an organism and the organism's structures and functions.
MEETS STANDARD	• Observe, draw, label, and compare and contrast the essential features of the life cycles of representative plants and animals including birth or germination, development of plants (seeds to roots, stems and leaves to flowers to seeds) and development of animals (e.g., frog, silk moth, cricket) with only minor error or missions. • Classify structures of various organisms according to their functions, with minor errors. • Give examples of specific features which enable a wide variety of plants and animals to live in their environments.
APPROACHES STANDARD	• Identify and describe life cycles of different living things, but descriptions are inaccurate or lack important detail. • Recognize that various organisms have similar structures, but have difficulty relating structures to functions. • Can identify distinctive features of plants and animals, but may have difficulty describing how these features help them live in their environments.
BELOW STANDARD	• Have difficulty conceptualizing and identifying stages of development. • Require assistance to relate similar structures of different organisms. • Display insufficient knowledge of how the features of plants and animals are related to their environments.

Science Performance Level Descriptors
Life Science
Grade 5

Content Standard 7.0	Internal and External Influences on Organisms: **Students understand that organisms respond to internal and external influences.**
EXCEEDS STANDARD	• Accurately relate sensory input to behavioral responses, provide multiple examples of special ways in which humans, plants, and animals respond to stimuli. • Provide evidence of teaching an organism a learned behavior. • Accurately interpret various environmental conditions as favorable or unfavorable to a specific living thing.
MEETS STANDARD	• Relate sensory input to behavioral response, with reasonable assistance (e.g., plant turning toward the sun, animals turning toward sound). • Develop a reasonable plan to teach an organism a learned behavior. • Make reasonable predictions that some environmental conditions are more favorable than others to living things (e.g., that there is a far greater diversity of life in a rain forest than in a desert or tundra).
APPROACHES STANDARD	• Attempt to relate sensory input to behavioral response with limited success. • Develop a plan, with assistance, to teach an organism a learned behavior. • Make simple inferences about environmental conditions that may be favorable or unfavorable to living things.
BELOW STANDARD	• Demonstrate serious misconceptions in relating sensory input to behavioral response. • Are unable to develop a plan to teach an organism a learned behavior. • Can not identify specific environmental conditions as favorable or unfavorable to living things.

Science Performance Level Descriptors
Life Science
Grade 5

Content Standard 8.0	Heredity and Diversity: **Students understand that life forms are diverse, and that they pass some characteristics to their offspring.**
EXCEEDS STANDARD	• Select examples of animal species that seem to be limited to inherited behaviors and examples of animal species that can learn a wide variety of behaviors and relate these behaviors to the complexity of their respective brains. • Explain that living things can be classified by similar features, behaviors, and/or habits, depending on the purpose of the classification and provide classifying examples of each type. • Research evidence of the range of variation in some organisms and graph the range of variation. • Explain why reproduction is such a crucial issue to endangered species.
MEETS STANDARD	• Differentiate inherited traits from learned traits and illustrate with appropriate examples. • Explain that living things are classified by similar features, behaviors, and/or habits and provide some examples. • Illustrate, by providing several examples, that there are variations among individuals within a population of certain species. • Relate reproduction to the continuation of species.
APPROACHES STANDARD	• Given examples, can generally differentiate between inherited traits from learned traits. • Describe that living things are classified by similar characteristics, behaviors, and/or habits, but are unable to provide examples. • Provide limited numbers of examples (one or two) of variations among individuals within a population of a certain species. • Require assistance to relate reproduction to the continuation of species.
BELOW STANDARD	• Have little success differentiating between learned and inherited traits. • Are unable to provide examples of variations among individuals within a population of certain aspects. • Do not relate reproduction to the continuation of species.

Science Performance Level Descriptors
Life Science
Grade 5

Content Standard 9.0	Evolution-The Process of Biological Change: **Students understand that life forms change over time.**
EXCEEDS STANDARD	• Construct a hierarchical concept map depicting major groups of plants, animals, other and their characteristics; include flowering plants, cone-bearing plants, ferns, invertebrates, vertebrates, birds, reptiles, mammals, etc. • Provide well-developed examples of environmental changes that have allowed some species to survive and others to become extinct. • Show that in a given environment different animals have made different adaptations for survival; include specific, clarifying examples.
MEETS STANDARD	• Classify animals and plants according to their physical characteristics. • Identify examples of environmental changes that have allowed some species to survive and caused others to become extinct. • Identify examples of how differences in individual characteristics may give an advantage for survival.
APPROACHES STANDARD	• Classify animals and plants according to their physical characteristics, with some errors. • Require assistance to identify examples of environmental changes that have allowed some species to survive and caused others to become extinct. • Make vague connections between adaptations and survival rate.
BELOW STANDARD	• Demonstrate major misconceptions regarding classification. • Have little success in relating environmental changes to the survival or extinction of some species. • Provide no evidence of being able to relate adaptation and survival rates.

Science Performance Level Descriptors
Earth and Space Sciences
Grade: 5

Content Standard 10.0	**Earth Structures and Composition:** Students understand that the Earth is composed of interrelated systems of rocks, water, air, and life.
EXCEEDS STANDARD	• Classify rock samples into self-generated categories on the basis of easily observed properties of the minerals they contain. • Develop a model which can be used to show how one variable (e.g., slope, soil consistency, amount of rainfall, plant coverage) influences erosion rate. • Use maps to describe the locations of various topographical features (e.g., specific mountain ranges, canyons, trenches) on continents and the ocean floor. • Given samples of soil, relate the composition of the soil to its origin.
MEETS STANDARD	• Describe the mineral content of a rock sample in terms of easily observed properties of the minerals it contains (e.g., color/darkness of minerals, size of crystals). • Describe relationships, using models and references to first-hand observations, between increase in slope and increase in erosion rate; increase in slope and decrease in deposition rate; and the ways in which man's activities can increase erosion rates (e.g., deforestation and soil removal) or decrease erosion rates (e.g., reforestation or minimum-impact construction). • Describe, using models or maps, flat, protruding, and depressed features of the Earth's surface, including features of the ocean floor. • Describe the composition of samples of soil in terms of constituents (e.g., rock/mineral fragments, organic material, moisture content, organisms); compare and contrast soil samples from different places.
APPROACHES STANDARD	• Give some inaccurate descriptions of easily observed properties of minerals contained in a rock sample. • Make a narrow range of connections between rates of erosion/deposition and factors which influence those rates. • Incompletely describe topographical features (e.g., do not include those found on the ocean floor). • Describe soil samples, but may not include significant constituents of that soil; make comparisons of soil that are unclear.
BELOW STANDARD	• Are unable to describe accurately any easily observed properties of minerals found in a rock sample. • Have limited or no success in making connections between rates of erosion/deposition and factors which influence those rates. • Describe topographical features with only rudimentary detail. • Are unable to describe constituents of soil samples or to make comparisons between different samples of soil.

Performance Level Descriptors
Earth and Space Sciences
Grade 5

Content Standard 11.0	**Earth Models:** Students understand that the Earth may be represented by a variety of maps and models.
EXCEEDS STANDARD	• Interpret data shown on different kinds of maps, including local, state, and national road maps, as well as precipitation, temperature, and vegetation maps; interpret Arial photos. • Use the Nevada state road map to calculate distances and times between various points of interest in the state; construct a map of local features with extensive details (e.g., a key, a scale).
MEETS STANDARD	• Identify, given a map, the directions northeast, northwest, southeast, and southwest. • Use the Nevada state road map to plan a route between various points of interest in the state (e.g., plan a route from their home to an interesting feature like the Berlin Ichthyosaur or Lehmann Caves), with minimal assistance; construct a map of a local or regional feature (e.g., the classroom, school grounds, or neighborhood), with minimal assistance.
APPROACHES STANDARD	• Inconsistently identify north, south, east, and west on a map. • Use the Nevada state road map to plan a route between various points of interest in the state, with some illogical errors; construct a map of a local or regional feature which lacks some necessary details.
BELOW STANDARD	• Are unable to identify north, south, east, or west on a map. • Attempt to use the Nevada state road map to plan a route between various points of interest in the state, but the route contains serious errors; construct a mostly inaccurate map of a local or regional feature.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 5

Content Standard 12.0	**Earth History:** Students understand that Earth systems (such as weather and mountain formation) may change or vary.
EXCEEDS STANDARD	• Identify processes and classify the rates of change that occurred in the formation of a landform. • Use fossil evidence, such as similarities to present-day organisms, tracks and trails, to infer how a particular prehistoric creature lived.
MEETS STANDARD	• Compare and contrast, using various laboratory, print, multimedia, and Internet resources, the amount of time required to cause various changes on the surface of the Earth (e.g., weathering, erosion, earthquakes, volcanic eruptions). • Simulate, using hands-on materials, and describe the various ways that fossils form (e.g., cast/mold formation, imprints) with minimal assistance.
APPROACHES STANDARD	• Provide some unrealistic rates for various changes on the surface of the Earth. • Simulate and describe, with limited success, the various ways that fossils form.
BELOW STANDARD	• Provide mostly unrealistic rates for various changes on the surface of the Earth. • Are unable to simulate or describe the various ways that fossils form.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 5

Content Standard 13.0	**Earth and Space Sciences:** Students understand that Earth systems have a variety of cycles through which energy and matter continuously flow.

EXCEEDS STANDARD	• Explain, using first-hand observations where appropriate:
	  • that the sun is a useful source of energy for cooking or generating electricity
	  • that the sun provides energy for plant growth.
	  • that low-grade coal or peat is derived from plant material.
	  • how the sun is the ultimate source of energy for fossil fuels.
	  • wood or coal burnt and the energy released measured.
	• Correlate local weather to regional patterns by collecting data from a school weather station, newspapers or the Internet.
	• Observe pressure and relative humidity and use the observations to predict or explain local weather.
	• Design experiments to apply to a natural or artificial system that would test the predicted effects of changing a variable in that system.

MEETS STANDARD	• Investigate and explain, with examples, how the sun is the main source of energy for people. • Analyze, using print, maps, models, multimedia resources, and the Internet, various meteorological events (e.g., storms, flooding, drought), including their causes and effects. • Conduct investigations that demonstrate relationships among temperature, relative humidity, air movement, and rates of evaporation and condensation. • Observe natural (outdoor) and artificial systems, (e.g., terraria, decomposition columns, aquaria, stream tables, gardens, school environments) and describe the physical changes, (e.g., pH, temperature, relative humidity, changes in state of water, weathering, erosion) and biological changes (e.g., patterns of behavior, seasonal changes in form) that take place in those systems.
APPROACHES STANDARD	• Identify the sun as the main source of energy for people, but do not explain its role with sufficient detail or provide good examples. • Provide a narrow range of descriptions of meteorological events. • Collect data from investigations, but partially misinterpret the data. • Provides a narrow range of descriptions of changes in systems.
BELOW STANDARD	• May identify the sun as the main source of energy, but do not explain its role and provide examples. • Provide insufficient descriptions of meteorological events. • Have difficulty collecting and seriously misinterpret data. • Are unable to provide descriptions of changes in systems.

Science Performance Level Descriptors
Earth and Space Science
Grade 5

Content Standard 14.0	**Earth and Space Sciences:** Students understand that the Earth is part of a planetary system within the Milky Way galaxy, which is part of the known universe.
EXCEEDS STANDARD	• Build a model or draw a picture representing the solar system, which correctly portrays the relative orbits of planets around the sun. • Explain observations of the sun and moon in the sky by citing the rotation of the Earth and the revolution of the moon about the Earth; locate a common constellation in the sky, record its location over several months, and explain that different stars can be seen in different seasons. • Investigate and compare the sun and stars, using a variety of resources; demonstrate the relationship of distance to apparent size and brightness (e.g., place light source at different distances and describe its apparent sizes and brightness' and how this model helps to explain the appearances of the sun and stars from Earth.)
MEETS STANDARD	• Compare and contrast, citing print, multimedia, or Internet resources, the general features of planets and their moons, asteroids, comets, and the sun. • Describe, citing daily and nightly observations, or simulations (e.g., classroom ceiling star projector, college planetarium), the motion of the sun, moon, stars, and some planets across the sky. • Describe, citing daily and nightly observations, or simulations (e.g., classroom ceiling star projector, college planetarium), the distribution, brightness, and color of some major stars and constellations.
APPROACHES STANDARD	• Compare and contrast the general features of objects in the solar system, but descriptions are incomplete or erroneous. • Give descriptions of the motion of objects in the sky, which omit some key details. • Give descriptions of the distribution, brightness, and color of some major stars and constellations, which omit a few key details or contain some inaccuracies.
BELOW STANDARD	• Compare and contrast, with little or no success, the general features of objects in the solar system. • Give descriptions, which are incomplete and erroneous, of the motion of objects in the sky. • Describe, in a vague and confusing manner, the distribution, brightness, and color of major stars and constellations.

Science Performance Level Descriptors
Environmental Sciences
Grade 5

Content Standard 15.0	Ecosystems: **Students will demonstrate an understanding that ecosystems display patterns of organization, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.**
EXCEEDS STANDARD	• Analyze a specific habitat and identify producers, consumers, and decomposers, and diagram or illustrate their interactions. • Investigate and explain why plants and animals will survive well, less well, or will not survive at all in a particular environment; use specific examples. • Trace the energy flow through a selected ecosystem and identify other requirements for life that are met by the environment. • Compare a local ecosystem with another ecosystem in the state, region, or nation.
MEETS STANDARD	• Describe, using examples, several ways organisms interact with each other and with their non-living habitat, including dead plants and animals. • Match plants and animals that will survive well, less well, or will not survive at all to particular environments. • Explain why energy is required in an ecosystem, identify the sun as the energy source for most, and identify other requirements for life that are met by the environment. • List and describe unique characteristics of representative local ecosystems.
APPROACHES STANDARD	• Describe a few ways organisms interact with each other and with their non-living habitat. • Identify, with some errors, plants and animals that will survive well, less well, or will not survive at all in a particular environment. • Identify the sun as the energy source for most ecosystems but are not able to describe clearly the role of energy in ecosystems. • Describe, with assistance, unique characteristics of a local ecosystem.
BELOW STANDARD	• Describe superficially and/or inaccurately ways organisms interact with each other and with their non-living habitat. • Are unable to identify plants and animals that will survive, well, less well, or will not survive at all in a particular environment. • Are not able to describe why energy is required in an ecosystem and that the sun is the primary energy source for most. • Are able to provide only a minimal description of a local ecosystem, if at all.

Science Performance Level Descriptors
Environmental Sciences
Grade 5

Content Standard 16.0	**Natural Resources:** Students demonstrate and understand that natural resources include renewable and non-renewable materials and energy. All organisms, including human, use resources to maintain and improve their existence, and the use of resources can have positive and negative consequences.
EXCEEDS STANDARD	• Compare and contrast the uses of materials that have similar properties, and explain why the uses are appropriate for one material and not the other. • Use print, multimedia, and Internet resources to describe current efforts to design longer-lasting or more efficient machines, and how new designs can lead to more efficient uses of resources (e.g., ergonomics, miniaturization); redesign an existing machine (e.g., a toy) or process so that it uses fewer materials or less energy. • Describe, using a map of Nevada and information from state and federal agencies (e.g., the Department of Business and Industry, Department of Wildlife, State Parks, Bureau of Land Management), the locations and uses of natural resources acquired in Nevada (e.g., water, gold, gypsum, petroleum, ranch and farm land, recreation land, wildlife); and the locations of natural resources acquired outside the state (e.g., lumber, grain, fish, coal). • Compare and contrast, using print, multimedia, or Internet resources, the consumptive habits and patterns of resource use in developing and industrialized countries.
MEETS STANDARD	• Observe samples of various materials (e.g., wood, cloth, paper, metal, plastic, composites), and describe their properties (e.g., how they respond to various stresses, how they react with other materials/chemicals, what happens in the presence of heat/fire, electrical and magnetic properties); identify ways that observed properties of samples of materials make them useful for various human activities. • Investigate and describe the extent to which samples of man-made items (e.g., objects made of cloth, glass, paper, metal, plastic, composites, ceramics) can be used over and over; describe how a device can be made to operate with less energy (e.g., reducing friction by applying a lubricant such as graphite, using more aerodynamic and/or lightweight materials). • Describe, using information from state and federal agencies (e.g., the Department of Business and Industry, Department of Wildlife, State Parks, Bureau of Land Management), the kinds and uses of natural resources found in Nevada (e.g., water, gold, gypsum, petroleum, ranch and farm land, recreation land, wildlife); describe, using print, multimedia, or Internet resources, the kinds and uses of natural resources acquired nationally or globally (e.g., lumber, grain, fish, coal). • Contrast personal basic minimal resource needs (food/water, shelter, warmth) to actual resource use; suggest ways in which personal use of limited resources could be reduced.
APPROACHES STANDARD	• Observe and describe properties, with a few errors or omissions, but have difficulty relating properties to applications. • Describe how technology can be used to extend resources in general terms, but provide weak examples. • Describe Nevada's natural resources and uses, as well as significant resources acquired out-of-state, but omit some essential information. • Make contrasts that are somewhat incomplete or erroneous.
BELOW STANDARD	• Inadequately observe and describe properties; are unable to relate properties to applications. • Are unable to provide a coherent explanation of how technology can be used to extend resources. • Do not distinguish or describe adequately Nevada's natural resources and those acquired out-of-state. • May confuse "needs" and "wants"; contrasts are inaccurate.

Science Performance Level Descriptors
Environmental Sciences
Grade 5

Content Standard 17.0	Conservation: **Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole, and future generations.**
EXCEEDS STANDARD	• Investigate and compare and contrast examples of people living in the same time period with very different patterns of consumption. • Give a comprehensive description of components in an ecosystem that can be observed to change and components that do not change. • Explain that changes in environments can be natural events or influenced by human activities; cite specific examples and describe differences in long-term effects, if any.
MEETS STANDARD	• Describe how the consumption patterns of people living in the same time period vary from place to place. • Describe components of an ecosystem that can be observed to change and components that do not change. • Identify changes in environments as being natural events or influenced by human activities.
APPROACHES STANDARD	• Require assistance to identify differences in the consumption patterns of people. • Partially identify components in an ecosystem that can be observed to change and components that do not change. • Identify, with some assistance, changes in environments as being natural events or influenced by human activities.
BELOW STANDARD	• Have little success in identifying that consumption patterns of people vary from place to place. • Are unable to differentiate the components in an ecosystem that can be observed to change from those components that do not change. • Are unable to differentiate changes in environments caused by natural events from those influenced by human activities.

Science Performance Level Descriptors
Processes and Skills
Grade 5

Content Standard 18.0	Scientific, Historical, and Technological Perspectives: **Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole, and future generations. (Nature of Science, Attributes of Scientific Research, The History of Science and Invention, Technology, The Dynamic Character of Scientific Knowledge, Scientific Ethics)**
EXCEEDS STANDARD	• Develop a generalized approach to solving problems systematically. • Use actual observations and results of scientific investigations to form a possible explanation and new questions. • Research and use biographical information to make a written or oral report on past discoveries and inventions and relate the research to the natural world. • Demonstrate the benefits of collaboration by working together toward a common goal. • Can accurately use technological devices which can measure motion. • Identify relevant questions for further study while doing scientific investigations.
MEETS STANDARD	• Develop a systematic approach to solving a problem. • Use actual observations and results of scientific investigation to form a possible explanation. • Research and use biographical information to make a written or oral report that describes past discoveries and inventions. • Explain, with multiple examples, that working on a team brings greater results than working alone, (e.g., Apollo 13, Thomas Edison's work on the light bulb). • Use technological devices which can be used to determine motion (e.g., stop watches, radar guns). • Identify a question for further study while doing a scientific investigation (e.g., factors affecting plant growth).
APPROACHES STANDARD	• Explain that science is a logical process of coming up with an answer to a question • Attempt to use actual observations and results of scientific investigation to form possible explanations. • Research and use biographical information to make a written or oral report on a past discovery or invention. • Describe that working on a team brings greater results than working alone. • Have difficulty manipulating technological devices to measure motion. • Can describe that science is an ongoing process but cannot relate follow-up questions to a specific investigation.

Science Performance Level Descriptors
Processes and Skills
Grade 5 (Standard 18.0 continued)

BELOW STANDARD	• Have difficulty in grasping the logic of a scientific process that answers a question • Cannot connect actual observations and results of a scientific investigation to form a possible explanation. • With teacher assistance, use information supplied by the teacher to describe a past discovery or invention. • Characterize science as being done by individuals because credit is often attributed to individuals. • Cannot use technological devices which can measure motion. • Do not perceive science as an ongoing process.

Science Performance Level Descriptors
Processes and Skills
Grade 5

Content Standard 19.0	Reasoning and Critical Response Skills: **Students understand that many decisions require critical consideration and scientific evidence.**
EXCEEDS STANDARD	• Justify fully developed conclusions or explanations by use of well organized data and logical argument. • Insightful recognition of the limits of generalizations, assumptions, analogies and models.
MEETS STANDARD	• Justify conclusions or explanations by use of data and logical argument. • Recognize the limits of generalizations, assumptions, analogies and models. (e.g. solar system, evolution, model of atom…)
APPROACHES STANDARD	• Needs development in drawing conclusions or explanations by use of data and logical argument.
BELOW STANDARD	• Unable to justify conclusions or explanations by use of data and logical argument.

Science Performance Level Descriptors
Processes and Skills
Grade 5

Content Standard 20.0	**Systems, Models, Risk, and Predictions:** Students understand that a variety of models can be used to describe or predict things and events.
EXCEEDS STANDARD	• Construct a physical model and use it to explain a process that happens too quickly or too slowly for easy observation or is difficult to manipulate directly, (e.g., make clay land forms and use a stream table to demonstrate erosion). • Explain, with compelling examples, that the probability of an event happening depends on how closely present conditions match previous conditions. Explain that the validity of predictions depend on the size of the sample. • Describe and compare the components and interrelationships of a simple system accurately and with clarifying diagram(s).
MEETS STANDARD	• Use a physical model to explain how something works or is constructed. • Explain with examples that the probability of an event happening depends on how closely present conditions match previous conditions (e.g., weather, accidents). • Describe and compare the components and interrelationships of a simple system (e.g. tracing the flow of water through an aquarium, a filter and a pump).
APPROACHES STANDARD	• Attempt to use a physical model to explain how something works or is constructed but explanation is seriously flawed or incomplete. • Describe in general terms that some events are more likely to happen than others. • Lack the necessary detail in describing and comparing the components and interrelationships of a simple system.
BELOW STANDARD	• Have little success in developing a physical model to explain how something works or is constructed. • Are unable to articulate basic concepts about probability. • Cannot identify the components of a simple system and how they interact.

Science Performance Level Descriptors
Processes and Skills
Grade 5

Content Standard 21.0	Scientific Values and Attitudes: **Students understand that science is an active process of systematically examining the natural world.**
EXCEEDS STANDARD	• Keep accurate records of investigations and observations and do not change those records after the fact. • Make conscientious observations and test things more than once, using multiple trials to verify results. • Offer insightful reasons for their findings and weigh alternative reasons and suggestions, before drawing a conclusion.
MEETS STANDARD	• Keep accurate records of investigations and observations without changing those records later (i.e., do not change records to fit the norm). • Make conscientious observations and test things more than once; use repeated observations or trials to verify results. • Offer reasons for their findings and consider suggestions by others.
APPROACHES STANDARD	• Keep incomplete records of investigations and observations, and on occasion, may change records after the fact. • Make unclear observations and seldom use repeated observations to verify results. • Occasionally offer reasons for their findings and often misinterpret or fail to consider suggestions by others in the context of an investigation.
BELOW STANDARD	• Keep incomplete records of investigations, if at all, and sometimes make changes after the fact. • Have little success in making accurate observations and do not test findings more than once. • Offer few reasons for their findings and generally ignore suggestions by others.

Science Performance Level Descriptors
Communication Skills
Grade 5

Content Standard 22.0	Communication Skills: Students understand that a variety of communication methods can be used to share scientific information.
EXCEEDS STANDARD	• Provide clear written and oral instructions that others are able to follow consistently. • Organize information into charts, tables, and graphs so as to make patterns and relationships readily apparent. • Provide leadership to a collaborative group project.
MEETS STANDARD	• Provide written or oral instructions that others are able to follow. • Organize information into charts, tables, and graphs according to established criteria. • Collaborate on a group project.
APPROACHES STANDARD	• Write or give oral instructions that others find difficult to follow. • Organize information into charts, tables, and graphs, but labels, categories, and entries are often incorrect. • Need assistance in collaborating on a group project.
BELOW STANDARD	• Write or give oral instructions that others are unable to follow. • Can organize information into charts, tables, and graphs, only with sustained teacher assistance. • Have little success collaborating on a group project.

Science Performance Level Descriptors
Processes and Skills
Grade 5

Content Standard 23.0	Scientific Applications of Mathematics: **Students understand that scientific inquiry is enhanced and often communicated by using mathematics.**
EXCEEDS STANDARD	• Investigate the changes in the result of a simple experiment when they alter systematically each of several variables in turn. • Conceptualize and explain how to solve a group of related problems. • Make acceptable quantitative estimates of unfamiliar lengths, weights and time intervals and check them by measurements. • Consistently select a unit for a particular measurement which is appropriate in kind and magnitude. • Consistently recognize that there may be variations when everyone in the class makes a particular measurement, and explain the reasons for the variations.
MEETS STANDARD	• Investigate the change in the result of a simple experiment when they alter one of the experimental conditions (e.g., How will the length of the string affect the "swing" of a pendulum?). • Can generally explain the strategy and thinking they used to solve a particular problem. • Make acceptable quantitative estimates of familiar lengths, weights, and time intervals and check them by measurements. • Usually select the appropriate types of units for a particular measurement (e.g., meters for length, seconds for time, and kilograms for mass) and the appropriate magnitude of units for a particular measurement (e.g., meters, not centimeters, for measuring swimming pools). • Generally recognize that there may be variations when everyone in the class makes a particular measurement, but inconsistently explain why.
APPROACHES STANDARD	• Attempt to use a simple experiment to investigate the change in the result when they alter one of the experimental conditions. • Attempt to explain strategies and thinking used to solve problems, but have difficulty explaining steps they have used. • Make quantitative estimates of familiar lengths, weights and time intervals and check them by measurements but make multiple errors in estimating and/or measuring. • Have difficulty using the appropriate unit for a particular measurement. • Recognize that there may be variations when everyone in the class makes a particular measurement but do not know why.

Science Performance Level Descriptors
Processes and Skills
Grade 5 (Standard 23.0 continued)

BELOW STANDARD	• Can describe a cause/effect relationship but do not grasp the concept of a controlled experiment. • Mostly unable to explain strategies and thinking used to solve problems. • Attempt to make quantitative estimates and/or measurements of familiar lengths, weights, and time intervals, but estimates and measurements have significant errors. • Inaccurately choose the appropriate unit for a particular measurement. • Mostly lack recognition that there may be variations when everyone in the class makes a particular measurement.

Science Performance Level Descriptors
Processes and Skills
Grade 5

Content Standard 24.0	Laboratory Skills and Safety: **Students can appropriately and safely apply the tools and techniques of scientific inquiry.**
EXCEEDS STANDARD	• Consistently use safety equipment and attire and remind peers to do so. • Accurately measure and mix dry and liquid material safely in prescribed amounts. • Use provided materials effectively and efficiently to construct objects for a particular task. • Consistently label measurements, graphs, and diagrams correctly. • Select and use, effectively and efficiently, a range of instruments to measure physical quantities and record and store data. • Figure out how to manipulate objects to test variables in an experiment and observe events to form conclusions.
MEETS STANDARD	• Consistently use safety equipment and attire. • Generally measure and mix dry and liquid materials safely in prescribed amounts. • Properly use provided materials to construct objects for a particular task. • Generally label measurements, graphs, and diagrams correctly. • Select and use a range of instruments to measure physical quantities (e.g., length, volume, weight, time, temperature) and record data using traditional lab equipment as well as computers. • Given a set procedure can manipulate objects and observe events in an experiment.
APPROACHES STANDARD	• Use safety equipment and attire, when reminded. • Measure and mix dry and liquid material safely in prescribed amounts, with teacher assistance. • Use provided materials to construct objects for a particular task, with teacher assistance. • Make errors labeling measurements, graphs, and diagrams correctly. • On occasion make inappropriate selections of instruments to measure physical quantities and have some difficulty in recording data. • Can manipulate objects and observe events in an experiment with teacher support.

Science Performance Level Descriptors
Processes and Skills
Grade 5 (Standard 24.0 continued)

BELOW STANDARD	- Fail to use safety equipment and attire. - Have major difficulty measuring and mixing dry and liquid materials safely in prescribed amounts, even with direct supervision. - Have little success in use of provided materials to construct objects for a particular task. - Label measurements and diagrams incompletely or incorrectly. - Generally make inappropriate selections of, and have difficulty using, instruments. - Have little success in manipulating objects and observing events in an experiment, even with teacher support.

Science Performance Level Descriptors
Physical Science
Grade: 8

Content Standards 1.0	**Forces and Motion:** Students understand that forces such as gravitational, electrical, and magnetic influence the motion of objects.
EXCEEDS STANDARD	• Predict what will happen if more than one force acts on an object along a straight line and the forces reinforce or oppose one another, depending upon their direction and magnitude. • Explain and qualitatively interpret the relationship $F \propto m_1m_2/r\_$ using very small and very large masses and distances. • Explain the relationship among work, force, and distance and how simple machines change force and distance through which work is done, using multiple examples; identify which simple machine would be most efficient in moving a particular object, design and use a simple machine to solve a problem. • Correctly predict the relative buoyancy of different objects and demonstrate the relationship between buoyancy and the apparent weight of an object in liquid. • Design and/or build a model to demonstrate and explain the relationship between electricity and magnetism (e.g., electromagnet, simple electric motor).
MEETS STANDARD	• Explain how multiple forces acting on an object along a straight line will affect the motion of the object (e.g., the forces may be acting in the same direction or in opposite directions; the forces may be of equal magnitude or different magnitudes; or the object may be in motion or at rest). • Explain that every object in the Universe is attracted to every other object in the Universe and that the larger the masses, the greater the force of attraction, and that the greater the distance between the objects, the weaker the force of attraction. • Use a simple machine to solve a problem(e.g., moving an object from one place to another) and describe how simple machines change force and distance through which work is done. • Describe the relationship between buoyancy and the apparent weight of an object in liquid. • Investigate using direct observations, and describe that electric current produces magnetic forces, and moving magnets produce electric forces in conductors.
APPROACHES STANDARD	• Have difficulty explaining how multiple forces acting on an object affect the motion of an object. • Describe the basic concept of gravity, but inconsistently apply it. • Describe the relationship among work, force, distance, and how simple machines work incorrectly; can use a simple machine to solve a problem, with limited assistance. • Have some difficulty explaining the relationship between buoyancy and the apparent weight of an object in liquid. • Can describe the relationship between electricity and magnetism.

Science Performance Level Descriptors
Physical Science
Grade: 8 (Standard 1.0 continued)

BELOW STANDARD	• Are unable to explain how multiple forces acting on an object affect the motion of an object. • Cannot identify gravity as the force that causes objects to fall or planets to orbit. • Even with teacher support are unable to use a simple machine to solve a problem. • Are unable to make a connection among work, force, distance, and simple machines and/or even with teacher support use a simple machine to solve a problem. • Are unable to explain the relationship between buoyancy and the apparent weight of an object in liquid. • Are unable to describe the relationship between electricity and magnetism.

Science Performance Level Descriptors
Physical Science
Grade 8

Content Standard 2.0	**Structure and Properties of Matter:** Students understand that materials have distinct properties which depend on the amount of matter present, its chemical composition, and structure.
EXCEEDS STANDARD	• Use a simple model to explain differences among solids, liquids, and gases, what happens in phase changes, and what happens when a solid dissolves in a liquid. • Distinguish among a variety of substances by measuring their intrinsic properties. • Use two-and three-dimensional models to explain how atoms come together to form individual molecules (e.g., one water molecule or group of molecules to form liquid water), and identify limitations of the models; explain the meaning of chemical formulas in quantitative terms. • Draw models of simple atoms, indicating the appropriate position of protons, electrons, and neutrons and explain the significance of the atomic number with it. • Explain, model or diagram how the movement of particles determines whether a substance is a solid, liquid, or gas and predict how changes in temperature and pressure individually affect each state. • Explain, with appropriate analogies, that all known living and non-living substances are composed of elements and develop a hierarchical concept map to explain the relationships among elements, compounds, mixtures, and solutions, using examples.
MEETS STANDARD	• Use simple models (e.g., particle models) and measurements to explain observed properties of matter. • Separate substances based on their physical and chemical properties (e.g., color, solubility, chemical reactivity, melting point, boiling point). • Use models or diagrams to describe how atoms form molecules. • Explain that all atoms consist of protons, electrons and neutrons. • Explain three states of matter (solids, liquids, and gasses) as systems of particles of varying densities and degrees of organization. • Explain with examples how atoms of different elements can combine to form all known substances.
APPROACHES STANDARD	• Can use a simple model to describe differences in the states of matter. • Are able to identify various physical and chemical properties but are unable to use these properties to distinguish between substances. • Have difficulty in using diagrams to depict molecules and/or interpreting simple chemical formulas, with some teacher support. • Confuse the characteristics of protons, electrons and neutrons in the structure of atoms. • Identify the three states of matter as systems of particles but are not sure of patterns. • State that elements can combine to form various substances, but are unable to explain how.

Science Performance Level Descriptors
Physical Science
Grade: 8 (Standard 2.0 continued)

BELOW STANDARD	• Are unable to use models to illustrate the states of matter. • Are unable to identify various physical and chemical properties of matter. • Are unable to identify the quantitative relationship between atoms in a chemical formula. • Are unable to identify the components of an atom. • Are unable to explain the three states of matter in terms of particles. • Are unable to identify any relationship between atoms, elements, compounds, molecules, and mixtures.

Science Performance Level Descriptors
Physical Science
Grade 8

Content Standard 3.0	Students understand that changes in temperature and pressure can alter states of matter. Energy exists in many forms, and one form can change into another.
EXCEEDS STANDARD	• Given certain objects, correctly predict the relative rate at which heat will move from one object to the other; distinguish among conduction, radiation, and convection. • Investigate and diagram a heating or cooling curve identifying the energy changes for a specific substance that are taking place; interpret the relationship: heat = mass x specific heat x change in temperature. • Demonstrate the characteristics of waves using such things as ropes, water tables, and springs, and explain that waves move at different speeds in different materials; draw a diagram of the electromagnetic spectrum in terms of changing wavelengths. • Predict the characteristics of various circuits and design a circuit using certain specifications. • Create a system with a minimum of four different forms of energy (radiant, chemical, electrical, nuclear, and mechanical) changing form (i.e., illustrating energy transformation pathways); diagram a chemical or physical process, identifying changes in potential or kinetic energy; describe kinetic and gravitational potential energy in qualitative and quantitative terms, using examples.
MEETS STANDARD	• Describe the movement of heat from object to object incorporating the concepts of composition and proximity of the objects; identify in general terms which kinds of substances will conduct heat most readily. • Describe the specific energy changes that must occur for a substance to change states using such terms as, melting point, boiling point, etc. (e.g., diagram a heating or cooling curve identifying the phase changes that are taking place). • Investigate and describe the characteristics of waves using such things as ropes, water tables, and springs; describe that waves move at different speeds in different materials, using examples such as sound waves traveling in air as opposed to water; describe the electromagnetic spectrum and how wavelength changes from one end to the other; describe that the energy of waves can be changed into other forms of energy. • Create parallel, series and combination circuits; describe very simple properties of parallel and combination circuits (e.g., in these circuits, there are branches and current is distributed among the branches) and more sophisticated properties of series circuits (e.g., voltage, resistance, current). • Describe various ways energy can be transferred between systems or objects and the different forms of energy (radiant, chemical, electrical, nuclear, and mechanical). • Distinguish between potential and kinetic energy; give specific examples of each.

Science Performance Level Descriptors
Physical Science
Grade: 8 (Standard 3.0 continued)

APPROACHES STANDARD	• Are unable to correctly relate the movement of heat to the composition or proximity of objects. • State the difference between heat and temperature but may not be able to provide examples; can carry out phase change investigations, but are unable to interpret the results. • Are unable to accurately describe the nature of waves, including the transfer of energy and how waves are affected by movement through different materials. • Are unable to construct or adequately describe among parallel, series, and combination circuits. • Are unable to partially describe all of the various ways energy can be transferred and transformed. • Distinguish between potential and kinetic energy, with inaccuracies in the examples cited.
BELOW STANDARD	• Are unable to identify any relationship between the movement of heat and the composition or proximity of objects. • Are unable to distinguish heat and temperature and/ or describe a relationship between energy change and phase change. • Are unable to correctly describe the characteristics and/or behavior of waves correctly. • Are unable to identify a circuit as a parallel or series circuit. • Are mostly unable to identify various forms of energy or explain the transfer of energy. • Are unable to identify the difference between kinetic and potential energy; are unable to give examples of either kinetic or potential energy.

Science Performance Level Descriptors
Physical Science
Grade 8

Content Standard 4.0	**Chemical Reaction:** Students understand that chemical reactions change substances into different substances.
EXCEEDS STANDARD	• Summarize and Describe the significance of Lavoisier's experiment; apply the law of conservation of mass to chemical reactions. Use the concept of atoms to explain the conservation of mass. • Design simple investigations to test the effect of changing particle size, temperature, light and pH on chemical reactions; give examples of reactions that vary in rate from instantaneous to infinitesimally slow. • Observe and describe reactions which overall either require energy or release energy; give multiple examples of endothermic and exothermic reactions; relate the macroscopic changes (i.e., energy required or released) to what is happening on the microscopic level (i.e., the atomic level). • Describe the basic arrangement of elements in the periodic table; predict trends in the properties of elements across rows and down families (e.g., relative size of atoms, reactivity, etc.) Describe the behavior of exceptional elements (i.e., hydrogen and oxygen).
MEETS STANDARD	• Apply the concept of the conservation of mass to a given chemical reactions specifying the total mass of reactants and products; confirm that the same elements are present in the product(s) as were present in the reactants. • Carry out simple investigations and describe how the rate of a reaction can be changed when variables such as temperature, pH, and light are changed; give examples of applications of this concept such as storing certain substances in brown bottles, refrigeration, the effect of acid rain. • Observe and describe, using commonplace examples, chemical reactions which overall either require or release energy. • Describe the basic organization of the periodic table and describe patterns (i.e., location of metals, nonmetals, metalloids, noble gases) and chemical reactivity.
APPROACHES STANDARD	• Can sometimes apply the concept of the conservation of mass to chemical reactions; can generally confirm that the same elements are present in the product(s) as were present in the reactants. • Identify at least one variable that affects the rate of a reaction, but cannot describe how the knowledge could be applied. • Have difficulty relating the concept of energy to chemical reactions, or giving examples. • Can identify some overall patterns but are inconsistently able to predict common properties of elements using the periodic table (e.g., ionization tendency, relative size of atoms, reactivity, state of matter, electronegativity).

Science Performance Level Descriptors
Physical Science
Grade: 8 (Standard 4.0 continued)

BELOW STANDARD	• Inaccurately apply the concept of conservation of mass to chemical reactions. • Are unable to describe a relationship between the rate of a chemical reaction and variables such as pH and temperature. • Are unable to relate the concept of energy to chemical reactions. • Are unable to identify any patterns in the properties of elements in the periodic table.

Science Performance Level Descriptors
Physical Science
Grade 8

Content Standard 5.0	Nuclear Energy and Electromagnetic Energy: **Students understand that nuclear energy and electromagnetic energy are produced from both natural and human-made sources in many forms.**
EXCEEDS STANDARD	• Demonstrate the following properties of light: traveling in straight lines, reflection, refraction, transmission, absorption, and scattering. • Demonstrate the concept of half-life using models or manipulatives (e.g., beans and pie charts) and calculate the answers to simple half-life problems. • Research the environmental impact associated with high-level and low-level nuclear wastes; cite actual case studies and credit sources. • Use a prism to demonstrate and explain the Sun's visible spectrum; show where visible light falls within the electromagnetic spectrum. • Describe existing or potential applications of nuclear processing such as fusion and fission. • Create an analogy of how nuclear reactions convert small amounts of matter into a relatively large amount of energy; explain E = mc_.
MEETS STANDARD	• Investigate and describe the interaction of light with matter (e.g., transmission, absorption, scattering of light). • Explain what is meant by radioactive isotopes and describe their application to medicine, age dating and nuclear power plants). • Define high-level and low-level nuclear wastes and describe their associated hazards. • Describe the electromagnetic spectrum; qualitatively identify the waves produced by the Sun within the electromagnetic spectrum. • Compare and contrast the nuclear processes that occur in the Sun and other stars (fusion) with nuclear reactors (fission). • Explain how nuclear reactions convert small amounts of matter into a relatively large amount of energy; cite examples.
APPROACHES STANDARD	• Investigate the interaction of light with matter, but describe the behavior of light incompletely or inaccurately. • Have difficulty defining radioactive isotopes and/or describing applications in a lucid manner. • Do not distinguish between high-level and low-level nuclear wastes and/or fail to identify their major associated hazards. • Have difficulty identifying the waves produced by the Sun within the electromagnetic spectrum. • Compare and contrast the nuclear processes that occur in the Sun and other stars with nuclear reactors but omit essential information or report it inaccurately. • Have difficulty explaining how nuclear reactions convert small amounts of matter into a relatively large amount of energy.

Science Performance Level Descriptors
Physical Science
Grade: 8 (Standard 5.0 continued)

BELOW STANDARD	• Are unable to describe the interaction of light with matter. • Are unable to define and identify any applications for radioactive isotopes. • Are unable to distinguish between high-level and low-level nuclear waste and identify their major hazards. • Are unable to describe the electromagnetic spectrum. • Are unable to distinguish between nuclear fission and fusion. • Are unable to describe how nuclear reactions convert small amounts of matter into a relatively large amount of energy.

Science Performance Level Descriptors
Life Science
Grade 8

Content Standard 6.0	**Structure and Function: Students understand that all life forms, at all levels of organization, use specialized structures and similar processes to meet life's needs.**
EXCEEDS STANDARD	• Correctly and accurately analyze disease processes as breakdowns in structures and functions or organisms, and illustrate this principle with multiple examples of a range of diseases. • Provide multiple, accurate examples of life processes occurring at different levels of organization (cells, tissues, organs, systems). • Accurately identify and describe specialized plant structures and systems and relate them to their functions. • Uses specific vocabulary to accurately explain how cellular functions are guided by information stored in DNA.
MEETS STANDARD	• Explain with minimal assistance that diseases result from breakdowns in the structures or functions of an organism. • Explain, with an example, that life functions may occur at different levels of organization through specialized tissues, organs, and systems; for example: oxygen is exchanged at the lungs, transported in the blood, and used by the body's cells. • Identify various plant structures and systems, giving the function of each with minimal errors. • Explain, in general terms, that cellular functions are guided by information stored in DNA.
APPROACHES STANDARD	• Require substantial assistance to recognize that diseases disrupt bodily functions. • Display limited understanding of the relationship between cells, tissues, and systems. • Identify various plant structures and systems giving the function of each with significant errors. • Explain that cellular functions are guided by information stored in DNA but important details are missing.
BELOW STANDARD	• Demonstrate limited understanding that disease processes disrupt bodily functions. • Exhibit serious misconceptions about the relationship between cells, tissues, and systems. • Demonstrate little or no success in identifying plant structures or functions. • Provide incomplete explanation which lacks details or contains major errors.

Science Performance Level Descriptors
Life Science
Grade 8

Content Standard 7.0	Internal and External Influences on Organisms: **Students understand that organisms respond to internal and external influences.**
EXCEEDS STANDARD	• Research, using print and electronic media, how scientists go about determining whether specific behaviors are innate or learned (e.g., recent studies with primates, rodents, birds, etc.). • Explain how behavior may be based on experience and/or evolutionary history, illustrate with well-developed examples. • Investigate stimulus-response and describe how it applies to both plant and animal behaviors, citing specific examples. • Explain and give specific examples of how various viruses, bacteria, fungi, and parasites may infect the human body and interfere with its functions.
MEETS STANDARD	• Identify a given behavior as innate or learned, provide multiple, accurate examples of innate and learned behavior. • Explain that behavior may be based on experience and/or evolutionary history, but provide weak examples. • Accurately relate a given behavior to the stimulus that prompted it. • Explain that various viruses, bacteria, fungi, and parasites may infect the human body and interfere with its functions; give an example of each.
APPROACHES STANDARD	• Inconsistently identify given behaviors as innate or learned. • State that behavior may be based on experience and/or evolutionary history but are unable to illustrate with appropriate examples. • Relate a behavior to a given stimulus on a limited basis. • Provide an explanation (lacking necessary detail) that various viruses, bacteria, fungi, and parasites may infect the human body and interfere with its functions.
BELOW STANDARD	• Cannot identify behaviors as innate or learned. • Inaccurately describe that behavior may be based on experience and/or evolutionary history. • Vaguely relate behavior to stimulus. • Provide a minimal explanation that various viruses, bacteria, fungi, and parasites may infect the human body and interfere with its functions.

Science Performance Level Descriptors
Life Science
Grade 8

Content Standard 8.0	Heredity and Diversity: **Students understand that life forms are diverse, and that they pass some characteristics to their offspring.**
EXCEEDS STANDARD	• Explain, using diagrams, charts, and examples, how Mendel's experiments on heredity formed the foundation for the study of genetics. • Independently classify living things on the basis of similar characteristics and tell why certain organisms are grouped together, construct a dichotomous key to separate them into homogenous group. • Discuss the relationship between phenotypic variation in a species and selective breeding. • Demonstrate with illustrative diagrams, the difference between the processes and results of asexual and sexual reproduction, relate to asexual propagation of plants and cloning. • Predict the probability of particular traits for a single gene cross (e.g., sickle cell disease, PTC tasting), given the genotype of the parents. • Provide a fully developed description of a species and give examples of interspecies mating which results in nonfertile offspring, compare pairs of animals (e.g., horse/donkey; Chihuahua/Great Dane) and identify whether they belong to the same species. • Explain and give examples of how changes in the genes of sex cells may affect offspring.
MEETS STANDARD	• Adequately explain how Mendel's model of heredity predicts the passage of genetic instructions from one generation to another. • Classify given examples of living things on the basis of similar characteristics and tell why certain organisms are grouped together. • Explain that selective breeding has resulted in new varieties of domestic animals and plants, cite examples of both plants and animals. • Distinguish between processes involved in sexual and asexual reproduction. • Demonstrate that pairs of genes may control patterns of inheritance (e.g., use Punnett squares). • Describe species as organisms that can mate with each other and produce fertile offspring. • Explain that changes in the genes of sex cells may affect offspring.

Science Performance Level Descriptors
Life Science
Grade: 8 (Standard 8.0 continued)

APPROACHES STANDARD	• Provide an incomplete or inaccurate explanation that heredity is the passage of genetic instructions from one generation to another that is incomplete or inaccurate. • Classify given examples of living things on the basis of similar characteristics and tell why certain organisms are grouped together, with minor errors. • Describe, in general terms, selective breeding but have difficulty using the concept to explain new varieties of plants and animals. • Describe the processes of sexual and asexual reproduction incompletely or with some minor errors. • Demonstrate that pairs of genes may control patterns of inheritance, with some errors. • Provide a vague definition of a species or inaccurate examples. • Explain that changes in the gene of sex cells may affect offspring.

BELOW STANDARD	• Demonstrate little or no understanding that heredity is the passage of genetic instructions from one generation to another. • Makes major errors in classifying and provides inadequate rationale for groupings. • Are unable to describe and connect the concept to the production of new varieties of animals and plants. • Are unable to distinguish between the processes involved in sexual and asexual reproduction. • Demonstrate major misconceptions of how pairs of genes may control patterns of inheritance. • Are unable to define species. • Make major errors in explaining that changes in the genes of sex cells may affect offspring.

Science Performance Level Descriptors
Life Science
Grade 8

Content Standard 9.0	**Evolution-The Process of Biological Change: Students understand that life forms change over time.**
EXCEEDS STANDARD	• Explain how the variation of organisms within a species and how a great diversity of species increases the chance that some members of a species and/or some living things will survive, even if there are large changes in the environment. • Investigate, using print and electronic resources, how Darwin's observations led to a new view of the origin and diversity of species; summarize his key findings. • Provide a wide range of examples that show how species are adapted to their particular environments and describe the mechanism which gave rise to the adaptations. • Explain, using diagrams and well-chosen examples, that the greater the number of characteristics organisms share, the more closely they are related. • Use fossil evidence to explain how organisms have changed over time, cite major molecular, embryological and structural evidence that substantiate conclusions drawn from fossil studies.
MEETS STANDARD	• Investigate and provide an estimate of the number of species of animals, plants and microorganisms that are alive today. • Explain differences and similarities between species in terms of biological evolution. • Give multiple examples of how organisms have adaptive characteristics that have allowed them to survive and therefore reproduce. • Explain that all organisms show general similarities of internal structures and chemical processes. • Outline, using drawings, diagrams, charts, etc., major lines of evidence that support evolutionary relationships among species (e.g., fossil record, DNA sequences, any atomical similarities, etc.).
APPROACHES STANDARD	• State that millions of species of animals, plants, and microorganisms are alive today, but do not provide supporting detail. • Require assistance to explain differences and similarities between species in terms of biological evolution. • Have difficulty relating the adaptive characteristics of an organism to its ability to survive and therefore reproduce. • Have limited success in identifying similarities among the internal structures and/or functions of different organisms. • Describe, in vague terms, various lines of evidence supporting evolutionary relationships.

Science Performance Level Descriptors
Life Science
Grade: 8 (Standard 9.0 continued)

BELOW STANDARD	• Are unable to articulate the concept that millions of species of animals, plants, and microorganisms are alive today. • Have limited success in explaining differences and similarities between species in terms of biological evolution. • Make little or no connection between an organism's adaptive characteristics and its ability to survive and therefore reproduce. • Make little or no connection between the presence of similar internal structures and chemical processes and the relatedness of different organisms. • Are unable to cite evidence used to establish evolutionary relationships among species.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 8

Content Standard 10.0	**Earth Structures and Composition:** Students understand that the Earth is composed of interrelated systems of rocks, water, air, and life.
EXCEEDS STANDARD	• Identify mineral samples on the basis of physical properties, and identify rock samples on the basis of obvious physical features. • Develop models to explain the formation of specific local landforms (e.g., volcanic mountains, fault-block mountains, caves, glacial valleys, river valleys). • Accurately differentiate between the internal layers of the Earth using a physical model or a multimedia presentation and/or describe properties of the internal layers of the Earth using materials with similar properties (e.g., use a cornstarch/water model to illustrate the plasticity of the mantle). • Examine soil samples, accurately relate properties of various soil samples to each sample's place of origin, and accurately identify some basic nutrients found in soil samples (e.g., nitrates, phosphates). • Give substantial explanations about how the varying properties of the atmosphere affect human activities (e.g., how the ionosphere affects radio and television communication, how changes in pressure with elevation affect boiling points and aircraft construction, how ozone blocks ultraviolet radiation). • Evaluate critically and discuss the feasibility of predicting and controlling geologic events.
MEETS STANDARD	• Describe mineral samples on the basis of physical properties (hardness, luster, color, streak, cleavage, and crystal shape) and describe rock samples on the basis of obvious physical features (e.g., sedimentary structures such as ripple marks, metamorphic structures such as foliation, igneous structures such as interlocking crystals). • Explain, using models (e.g., stream tables, clay layers), how erosion, deposition, and pushing and pulling forces inside the Earth create landforms (e.g., mountains, valleys). • Describe, using three-dimensional models or drawings, the internal layers of the Earth (i.e., continental and oceanic crust, a hot, convecting mantle, and a dense, metallic core). • Demonstrate, compare, and contrast the properties of various soil samples (e.g., color, texture, capacity to retain water), and explain, citing observations of actual soil samples, that soil contains materials that are required for things that live in the soil. • List the major components of the atmosphere at the Earth's surface and their relative abundance (i.e., nitrogen is the largest component, followed by oxygen, with other gases like carbon dioxide and water vapor in smaller amounts); describe how the properties (temperature, density, and pressure) and composition of the atmosphere vary with elevation. • Describe causes and effects of geologic events (e.g., earthquakes, landslides, volcanoes, floods).

Science Performance Level Descriptors
Earth and Space Sciences
Grade: 8 (Standard 10.0 continued)

APPROACHES STANDARD	• Make some errors in describing the properties of minerals and/or rock samples. • Attempt to use models to explain how landforms form, but explanations lack clarity. • Omit necessary details when describing the internal layers of the Earth. • Demonstrate some knowledge of soil properties, but ineffectively relate soil's composition to the requirements of things that live in the soil. • Describe the atmosphere, but leave out some significant details; provide unclear comparisons and contrasts of atmospheric structure and properties. • Incompletely and inaccurately describe geologic phenomena.
BELOW STANDARD	• Have difficulty in describing the properties of minerals and rock samples. • Provide inaccurate descriptions of how landforms form. • Have little success in describing the internal layers of the Earth. • Have little success in describing the properties of soil, and demonstrate little or no understanding of soil's role in supporting life. • Are unable to describe structure or properties of the atmosphere. • Give mostly incomplete and inaccurate descriptions of geologic phenomena.

Performance Level Descriptors
Earth and Space Sciences
Grade 8

Content Standard 11.0	**Earth Models:** Students understand that the Earth may be represented by a variety of maps and models.
EXCEEDS STANDARD	• Define locations on the surface of North America using township and range coordinates, and explain the historical origins of that system of land division. • Use a compass and different kinds of maps to follow a route through an area. • Create a color-coded map to compare and contrast various features over an area. • Determine the date and time of day in various places throughout the world (including across the International Date Line), given the local date and time of day.
MEETS STANDARD	• Define locations on the Earth's surface using degrees of latitude and longitude coordinates. • Compare and contrast the kinds of features found on various kinds of maps (contour, physical, political, geological); find the state of Nevada or Nevada features (depending on map scale) on various kinds of maps (contour, physical, political, geological). • Use a color-coded map to compare and contrast various features (e.g., temperature, population density, geology, precipitation). • Determine the time of day in various places throughout the world (but not across the International Date Line), given the local time of day.
APPROACHES STANDARD	• Define inconsistently locations on the Earth's surface using degrees of latitude and longitude coordinates. • Compare and contrast, with limited success, the kinds of features found on various kinds of maps; inconsistently find the state of Nevada or Nevada features on various kinds of maps. • Use a color-coded map to compare and contrast various features, with limited success. • Determine, with some errors, the time of day in various places throughout the world, given the local time of day.
BELOW STANDARD	• Are unable to define locations on the Earth's surface using degrees of latitude and longitude coordinates. • Compare and contrast, with little success, the kinds of features found on various kinds of maps; have little success finding the state of Nevada or Nevada features on various kinds of maps. • Use a color-coded map to compare and contrast, with little or no success, various features. • Are unable to determine the time of day in various places throughout the world, given the local time of day.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 8

Content Standard 12.0	**Earth History:** Students understand that Earth systems (such as weather and mountain formation) may change or vary.
EXCEEDS STANDARD	• Identify comprehensively and systematically the processes and rates of change that occurred in the formation of a landform. • Construct a model of the geologic time scale which includes details of major geologic events (e.g., mountain building, continental drift) and major life forms of Precambrian time and of the Palezoic, Mesozoic, and Cenozoic eras. • Infer, citing correlations with present-day organisms and geologic processes, a past environment and/or behavior of an extinct organism given details of the organism's features and features of the rock in which its fossil is found.
MEETS STANDARD	• Identify key processes and rates of change that occurred in the formation of a landform (e.g., slow processes of weathering, erosion, deposition; relatively fast processes of volcanism, mass wasting) • Apply, using actual, replica, or graphic reproductions of fossils, the following evidence to show that life forms and environmental conditions change over time: •the fossil record reflects a pattern of change in organisms over time. •many fossils are similar to organisms that are alive today, allowing logical comparisons of past and present environments. •describe reasons that fossil evidence may not form or may be destroyed (e.g., scavenger and decomposer activity, weathering/eroision). •describe reasons that fossil evidence may not form or may be destroyed (e.g., scavenger and decomposer activity, weathering/eroision). • Provide a reasonable description of how weathering, erosion, deposition, radioactive decay, volcanic activity, plate tectonics, and many other natural processes that occur presently are the same as those that occurred in the past.
APPROACHES STANDARD	• Ineffectively identify processes and rates of change that occurred in the formation of a landform. • Ineffectively apply evidence in attempting to show that life forms and environmental conditions change over time; describe reasons, with some inaccuracies, that fossil evidence may not form or may be destroyed. • Provide a partial description of how weathering, erosion, deposition, radioactive decay, volcanic activity, plate tectonics, and many other natural processes that occur presently are the same as those that occurred in the past.

Science Performance Level Descriptors
Grade: 12 (Standard 12.0 continued)

BELOW STANDARD	• Identify, with little success, processes and rates of change that occurred in the formation of a landform. • Are unable to use evidence to show that life forms and environmental conditions change over time and/or provide credible reasons that fossil evidence may not form or may be destroyed. • Provide fragmented or inaccurate descriptions of how weathering, erosion, deposition, radioactive decay, volcanic activity, plate tectonics, and many other natural processes that occur presently are the same as those that occurred in the past.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 8

Content Standard 13.0	**Earth and Space Sciences:** Students understand that Earth systems have a variety of cycles through which energy and matter continuously flow.
EXCEEDS STANDARD	• Demonstrate in writing with appropriate diagrams or charts, a thorough understanding that the sun is the ultimate source of energy for key Earth processes, trace the flow of energy in each process. • Make logical short-term predictions about local and regional weather using first-hand observations or logical long-term predictions about climate, using weather and climate maps. • Explain, using diagrams and citing first-hand observations, how water dissolves minerals and gases as it passes through the water cycle and carries them to oceans and lakes. • Infer the climate throughout a hypothetical region, given information about the region's proximity to large bodies of water, patterns of atmospheric movement, latitudes, and altitudes. • Observe and describe a wide variety of processes that are reversible and others that are practically irreversible. • Explain extensively that Earth is an open system with respect to energy. • Explain extensively how geothermal power is used by humans, and locate some sources of geothermal energy on a map of Nevada.

MEETS STANDARD	• Explain, using diagrams and words, that the sun is the ultimate source of energy for major Earth processes (e.g., from sun to plant to fossil fuel; from sun to evaporation to precipitation to weathering and erosion due to water).
	• Explain, citing direct observations of the high specific heat of water (i.e., water's relatively high capacity to absorb heat and release heat slowly), the moderating effect that large bodies of water have on weather and climate;
	  • explain, using weather maps, the weather that occurs near boundaries between air masses.
	  • describe the formation and types of clouds and how these cloud types are associated with particular patterns of weather (e.g., particular clouds often precede particular kinds of fronts between air masses; cumulonimbus clouds are typically associated with thunderstorms).
	  • explain the relationship between temperature, moisture, and origin of air masses (e.g., air masses that form over land tend to be dry; air masses that form in polar regions tend to be cold).
	  • explain, citing first hand observations (e.g., radiation striking a surface from a light bulb at various angles of incidence), the relationship between changes in the aspect of Earth's axis relative to the sun and the incidence of solar radiation.
	  • explain, using climate and weather data, diagrams, maps, and models, how long-term patterns of air movement combined with regional topography affect regional climate (e.g., rain-shadow deserts caused by coastal mountain ranges).
	• Explain, using a model or a diagram, how water circulates through the Earth, oceans and atmosphere through interlinked cycles of evaporation, condensation, transpiration, runoff, and groundwater percolation.
	• Describe, using climate and weather data, drawings, and maps, how climate is affected by proximity to large bodies of water, patterns of atmospheric movement, latitude, and altitude.
	• Observe and describe amply some processes that are reversible (e.g., pH indicator changes, stretching a spring within its elastic limit) and others that are practically irreversible (e.g., burning, stretching a spring beyond its elastic limit, extinction of a species)
	• Explain, citing first-hand observations (e.g., the conservation of energy in calorimeter experiments) that the energy the Earth receives over geologic time approximately equals the energy that it loses.
	• Describe, using diagrams and models, the relationships among geothermal and tectonic processes (i.e., geothermal processes occur near lithosphere plate boundaries, or where lithosphere plates are fractured or relatively thin).

Science Performance Level Descriptors
Earth and Space Sciences
Grade: 8 (Standard 13.0 continued)

APPROACHES STANDARD	• Demonstrate, using diagrams and words, incomplete understanding that the sun is the ultimate source of energy for many Earth processes. • Attempt to explain, citing direct observations of the high specific heat of water, the moderating effect that large bodies of water have on weather and climate. • Attempt to explain, using weather maps, the weather that occurs near boundaries between air masses. • Attempt to describe the formation and types of clouds and how these cloud types are associated with particular patterns of weather. • Attempt to explain the relationship between temperature, moisture, and origin of air masses. • Attempt to explain, citing first-hand observations, the relationship between changes in the aspect of Earth's axis relative to the sun and the incidence of solar radiation. • Attempt to explain, using climate and weather data, diagrams, maps, and models, how long-term patterns of air movement combined with regional topography affect regional climate. • Attempt to explain, using a model or a diagram, how water circulates through the Earth, oceans and atmosphere through interlinked cycles of evaporation, condensation, transpiration, runoff, and groundwater percolation. • Describe with some inaccuracies, using climate and weather data, drawings, and maps, how climate is affected by proximity to large bodies of water, patterns of atmospheric movement, latitude, and altitude. • Observe and describe, with some errors, some processes that are reversible and others that are practically irreversible • Attempt to explain, citing first-hand observations, that the energy the Earth receives over geologic time approximately equals the energy that it loses. • Describe, with some inaccuracies, using diagrams and models, the relationships among geothermal and tectonic processes .
BELOW STANDARD	• Explain, with little success, that the sun is the ultimate source of energy for many Earth processes. • Explain, with little success, the moderating effect that large bodies of water have on weather and climate. • Explain, with little success, the weather that occurs near boundaries between air masses. • Describe, with little success, the formation and types of clouds and how these cloud types are associated with particular patterns of weather. • Explain, with little success, the relationship between temperature, moisture, and origin of air masses. • Explain, with little success, the relationship between changes in the aspect of Earth's axis relative to the sun and the incidence of solar radiation. • Explain, with little success, using climate and weather data, diagrams, maps, and models, how long-term patterns of air movement combined with regional topography affect regional climate. • Explain, with little success, how water circulates through the Earth, oceans and atmosphere. • Describe with major inaccuracies, how climate is affected by proximity to large bodies of water, patterns of atmospheric movement, latitude, and altitude. • Observe and describe insufficiently some processes that are reversible and others that are practically irreversible • Explain, with little success, that the energy the Earth receives over geologic time approximately equals the energy that it loses. • Describe, with major inaccuracies, the relationships among geothermal and tectonic processes .

Science Performance Level Descriptors
Earth and Science
Grade 8

Content Standard 14.0	**Earth and Science Descriptors:** Students understand that the Earth is part of a planetary system within the Milky Way galaxy, which is part of the known universe.
EXCEEDS STANDARDS	• Investigate, using print, multimedia, or Internet resources, and describe in detail, using drawings or models, the size, mass, composition, atmosphere, water content, temperature, and surface features of the planets in our solar system. • Investigate, using print, multimedia, or Internet resources, and demonstrate convincingly, with drawings or models, how seasons, eclipses, moon phases, and tides are caused by the effects of relative motion and positions of the sun, Earth, and moon. • Describe the Big Bang Theory of the origin of the universe and cite supporting evidence. • Explain, using diagrams or multimedia software, how radio and optical telescopes function. • Make predictions, using diagrams or software simulations, of planetary motion and interactions by qualitatively applying the laws of Kepler and the universal law of gravitation.
MEETS STANDARD	• Investigate, using print, multimedia, or Internet resources, and describe, using drawings or models, principle characteristics such as size, mass composition (i.e., gas, ice, rock), and surface features (e.g., volcanic and erosional features, coloration) of the planets in our solar system. • Investigate, using print, multimedia, or Internet resources, and describe, using drawings or models, how seasons, eclipses, moon phases, and tides are caused by the effects of relative motion and positions of the sun, Earth, and moon. • Explain that billions of galaxies form most of the visible mass in the universe; compare the chemical composition of galaxies to that of planet Earth. • Explain how various tools (e.g., optical and radio telescopes, unmanned robotic spacecraft), allow us to investigate objects in the sky that are too distant, faint, or bright to observe directly from Earth. • Describe the historical development of some of the laws of motion (e.g., the laws of Kepler and Newton) that apply to the motion of objects in the solar system.
APPROACHES STANDARD	• Investigate, using print, multimedia, or Internet resources, and describe, with some errors, using drawings or models, the size, mass, composition, and surface features of the planets in our solar system. • Investigate, using print, multimedia, or Internet resources, and describe, with some errors, using drawings or models, how seasons, eclipses, moon phases, and tides are caused by the effects of relative motion and positions of the sun, Earth, and moon. • Attribute most of the visible mass in the universe to galaxies. • Attempt to explain how various tools allow us to investigate objects in the sky that are too distant, faint, or bright to observe directly from Earth, but are confused about the way the tools work and/or the information they provide. • Describe, with some errors, the historical development of some of the laws of motion that apply to the motion of objects in the solar system.

Science Performance Level Descriptors

Grade: 8 (Standard 14.0 continued)

BELOW STANDARD	• Investigate, but make poor use of resources, and describe, with major errors, the size, mass, composition, and surface features of the planets in our solar system. • Investigate, with minimum use of resources, and describe, with major errors, how seasons, eclipses, moon phases, and tides are caused by the effects of relative motion and positions of the sun, Earth, and moon. • Are unable to describe that billions of galaxies form the visible mass in the universe. • Are unable to explain how various tools allow us to investigate objects in the sky from Earth. • Describe, with major errors, the historical development of some of the laws of motion that apply to the motion of objects in the solar system.

Science Performance Level Descriptors
Environmental Sciences
Grade 8

Content Standard 15.0	Ecosystems: **Students will demonstrate an understanding that ecosystems display patterns of organization, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.**
EXCEEDS STANDARD	• Develop a presentation to represent visually and explain how organisms interact with the living and non-living components of their ecosystems; include food chains and food webs; predict how a change in an organism (e.g., population of rabbits), and a change in a non-living component (e.g., nitrate run-off from fertilizer in a stream bordering farmland), will affect other organisms in the ecosystem. • Analyze an ecosytyem, with explanation of the role that selected organisms perform in their ecosystem; show that some relationships may be competitive or mutually beneficial. • Compare and contrast photosynthetic and chemosynthetic energy bases for ecosystems; cite specific examples. • Compare and contrast in a wide variety of geographically distinct ecosystems.
MEETS STANDARD	• Develop a presentation to represent visually and explain how organisms interact with the living and non-living components of their ecosystems; include food chains and food webs. • Characterize organisms in a variety of ecosystems by their function (i.e., producer, consumer, predator, prey, parasite, host, scavenger, decomposer). Analyze the role of predators as a stabilizing factor in an ecosystem, explaining how they can prevent habitat destruction or species extinction, citing specific examples. • Trace the flow of energy in an ecosystem, noting the dissipation of heat at each energy transfer point and describe the impact on the ecosystem (e.g., compare the resource implications of a vegetarian diet to one with high meat consumption). • Identify similarities and differences found in geographically distinct ecosystems.
APPROACHES STANDARD	• Develop a presentation to represent visually how organisms interact with the living and non-living components of their ecosystem with some knowledge, but explanation lacks detail. • Explain partially the role that selected organisms perform in their ecosystem. • Trace simplistically the energy flow in ecosystems from sunlight into chemical energy by producers. • Identify, with some assistance, similarities and differences found in geographically distinct ecosystems.

Science Performance Level Descriptors

Grade: 8 (Standard 15.0 continued)

BELOW STANDARD	• Develop a presentation to represent visually and explain how organisms interact with the living and non-living components of their ecosystem, but presentation is confusing and explanation lacks essential detail. • Provide explanation that lacks connection to the role that selected organisms perform in their ecosystem. • Demonstrate serious misconceptions in tracing the energy flow in ecosystems from sunlight into chemical energy by producers. • Identify, with little success, similarities and differences found in geographically distinct ecosystems.

Science Performance Level Descriptors
Environmental Sciences
Grade 8

Content Standard 16.0	**Natural Resources:** Students demonstrate and understand that natural resources include renewable and non-renewable materials and energy. All organisms, including human, use resources to maintain and improve their existence, and the use of resources can have positive and negative consequences.
EXCEEDS STANDARD	• Analyze and describe the costs and benefits of renewable and non-renewable resources. • Analyze and describe the relationships between the cost of natural resources and their abundance and/or accessible location . • Investigate, using print, multimedia, and/or Internet resources, and describe the location, distribution, and estimated reserves of non-renewable energy resources; describe strategies for managing these, including risks, benefits, and trade-offs for each. • Analyze and describe how organisms impact their local environment through their use of natural resources; cite specific examples. • Analyze and describe the impacts of using various technologies on the local or global environment.
MEETS STANDARD	• Observe and describe the identifying characteristics of renewable and non-renewable resources. • Explain how some natural resources are limited in their abundance and/or accessible location (e.g., water in the desert). • Investigate, using print, multimedia, or Internet resources, and describe the location and distribution of non-renewable energy resources. • Observe directly and use print, multimedia, and Internet resources to describe how organisms alter their local environment through their use of natural resources. • Describe how unintended consequences of technology can cause resource depletion (e.g., internal combustion engines burn fossil fuels which are non-renewable) and environmental degradation. (e.g., internal combustion engines cause air pollution); describe how technology can increase resource availability (e.g., internal combustion engines allow us to harvest and transport resources more efficiently), can mitigate environmental degradation (e.g., improvements in internal combustion engines design and their fuels lower rates of air pollution), and can make new resources economical (e.g., improvements in mining technology make it financially feasible to mine ores previously considered too low-grade to be profitable).
APPROACHES STANDARD	• Describe, with some errors, the identifying characteristics of renewable and non-renewable resources. • Describe, with some confusion, how some natural resources are limited in their abundance and/or accessible location. • Investigate, using print, multimedia, or Internet resources, and describe, with some errors, the location and distribution of non-renewable energy resources. • Observe directly and use print, multimedia, and Internet resources, but do not clearly describe how organisms alter their local environment through their use of natural resources. • Are unable to distinguish between how unintended consequences of technology can cause resource depletion or environmental degradation, and conversely how technology can increase resource availability, making new resources economical, and can mitigate environmental degradation.

Science Performance Level Descriptors

Grade: 8 (Standard 16.0 continued)

BELOW STANDARD	• Describe with major errors or significant omissions, the identifying characteristics of renewable and non-renewable resources. • Describe how some natural resources are limited in their abundance, but have difficulty in explaining the effect of accessibility on abundance. • Investigate, using print, multimedia, or Internet resources, and describe with major errors the location and distribution of non-renewable energy resources. • Are unable to identify how organisms alter their local environment through their use of natural resources. • Are not able to provide a coherent description of the positive and negative effects of technology on the environment.

316

Science Performance Level Descriptors
Processes and Skills
Grade 8

Content Standard 18.0	**Scientific, Historical, and Technological Perspectives:** Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole, and future generations. (Nature of Science, Attributes of Scientific Research, The History of Science and Invention, Technology, The Dynamic Character of Scientific Knowledge, Scientific Ethics)
EXCEEDS STANDARD	• Demonstrate that scientific investigations involve the following principles and apply them routinely: • use of logic; • respecting rules of evidence; • follow the standards for keeping a science notebook; • openness to criticism; • public reporting of methods and procedures. • Carry out three different types of authentic scientific investigations successfully • Research information and produce information with graphics that explains that ancient peoples provided knowledge about the natural world that is still regarded as valid today, even though that knowledge may not have originated by scientific methods. • Conduct investigations both alone and in teams; compare and contrast their results with the results of peers and account for discrepancies. • Compare and contrast essential features of scientific inquiry and technological design, using multiple and related examples of research and the application of the research in technology. • Review results and revise techniques and processes, redesigning their experiment accordingly. • Identify and describe, with examples, how science is subject to strengths and limitations as are other human social and intellectual activities.

Science Performance Level Descriptors

Grade: 8 (Standard 18.0 continued)

MEETS STANDARD	• Demonstrate that scientific investigations involve:
	    • use of logic (e.g., scientific investigation using step-by-step thinking);
	    • respecting rules of evidence (e.g., generally use truthful, careful, and accurate collection of evidence and information in a scientific investigation);
	    • follow the standards for keeping a science notebook;
	    • openness to criticism (e.g., respectfully consider constructive criticism and peer review; respectfully offer constructive criticism and peer review);
	    • public reporting of methods and procedures (e.g., peer review).
	• Successfully Carry out at least one of the following kinds of investigations successfully (i.e., a controlled experiment, a field study and a multiple-source research report).
	• Explain, using examples, that ancient peoples provided knowledge about the natural world that is still regarded as valid today, even though that knowledge may not have originated by scientific methods
	• Adequately model that scientists may work in teams and some may work alone, but all communicate extensively with each other. (e.g., by doing investigations and sharing results with others doing similar work, students benefit by learning through communication).
	• Compare and contrast scientific inquiry and technological design using multiple and related examples of research and the application of the research in technology (e.g., fish ladders, habitats and walkways for tortoises, handicap access, and pace makers).
	• Critique results, techniques, and processes used in a scientific investigation.
	• Compare and contrast the strengths and limitations of science as related to other human social and intellectual activities.

APPROACHES STANDARD	• Demonstrate some of the following principles in carrying out investigations:
	    • use of logic;
	    • respecting rules of evidence
	    • follow the standards for keeping a science notebook;
	    • openness to criticism;
	    • public reporting of methods and procedures.
	• Attempt to carry out one kind of scientific investigation but have difficulty with one or more aspects.
	• Describe an example where ancient peoples provided knowledge about the natural world that is still regarded as valid today, even though that knowledge may not have originated by scientific methods.
	• Conduct investigations as part of a team and share the results.
	• Can identify some important features that distinguish scientific inquiry and technological design.
	• Can identify the need to revise results, techniques, and processes used in a scientific investigation, but are unable to do so.
	• Identify and describe how science is subject to strengths and limitations as are other human social and intellectual activities.

Science Performance Level Descriptors

Grade: 8 (Standard 18.0 continued)

BELOW STANDARD	• Can identify the following principles as being essential to scientific investigations: • use of logic; • respecting rules of evidence • follow the standards for keeping a science notebook; • openness to criticism; • public reporting of methods and procedures. • Are unable to carry out a scientific investigation to completion. • Do not demonstrate that ancient peoples provided knowledge about the natural world that is still regarded as valid today, even though that knowledge may not have originated by scientific methods. • Explain that scientists communicate with each other but can not model the process. • Superficially describe that scientific inquiry and technological design have similarities and differences. • Can be prompted to review results, techniques, and processes used in a scientific investigation, but will not do so on their own. • Has little success in identifying and describing how science is subject to strengths and limitations related to other human social and intellectual activities.

Science Performance Level Descriptors
Processes and Skills
Grade 8

Content Standard 19.0	**Reasoning and Critical Response Skills:** Students understand that many decisions require critical consideration of scientific evidence.
EXCEEDS STANDARD	• Critique the use of statistics, data and graphs in a variety of scientific work. • Produce a thoughtful, quantitative analysis of controversial human activities with their associated benefits, costs and risks. • Analyze and clearly describe a simple system in terms of its simple efficiency, optimal function, and possible sources of malfunction. Use diagrams to predict the results if one or more components are changed. • Accurately evaluate information to distinguish among scientific evidence, bias and opinion when problem solving.
MEETS STANDARD	• Identify and evaluate the use of statistics, data and graphs in a variety of scientific work. • Give examples of human activities with their associated benefits, costs and risks (e.g., cloning, electric automobiles, and pest control). • Analyze and describe a simple system (e.g., pendulum, aquarium, toilet) in terms of its efficiency, optimal function, and possible sources of malfunction. • Evaluate information to distinguish between fact and opinion when problem solving (e.g., product advertising, early theories concerning flat earth vs. round earth).
APPROACHES STANDARD	• Identify but incorrectly evaluate the use of statistics, data and graphs in a variety of scientific work. • Give examples of controversial human activities, but incorrectly assess their associated benefits, costs and risks. • Analyze and describe, with significant errors, a system in terms of efficiency, optimal function, and possible sources of malfunction. • Ineffectively evaluates information to distinguish between fact and opinion when problem solving.
BELOW STANDARD	• Have difficulty in recognizing scientific evidence, bias and opinion. • Do not make appropriate use of statistics, data and graphs in a variety of scientific work. • Give examples of controversial human activities, but cannot assess their associated benefits, costs and risks. • Cannot describe a system in conceptual terms. • Confuse fact and opinion; state that every opinion is equally valid.

Science Performance Level Descriptors
Processes and Skills
Grade 8

Content Standard 20.0	Systems, Models, Risk and Predictions: **Students understand that a variety of models can be used to describe or predict things and events.**
EXCEEDS STANDARD	• Investigate, describe, and use two or more models to explain related events. • Make changes to a model and note the effects and predict what would happen if similar changes were made to the real situation; evaluate the model's usefulness (e.g., conduct tests with the use of models on the effect of erosion on various landforms). • Explain and illustrate natural cycles within systems. • Analyze data from two groups and calculate and compare their means, medians, modes, and ranges; explain the significance of these statistics. • Develop a generalized approach for analyzing the risks and benefits of any situation (e.g., walking to school, having trains pass through your community, driving a car).
MEETS STANDARD	• Use two different models to demonstrate the same thing (e.g., a map and a globe). • Use models to predict change (e.g., a stream table). • Identify and illustrate natural cycles within systems (e.g., water, planetary motion, climate, geological changes). • Analyze data from two groups, comparing their means, medians, modes and ranges, and explain why these statistics are important. • Use a systematic approach to describe the risks and benefits of a situation.
APPROACHES STANDARD	• Describe how two different models can be used to demonstrate the same thing but confuse the models or fail to identify and relate key features of the models to the event. • Can manipulate a model, but experience difficulty in making reasonable predictions. • Identify and illustrate natural cycles within systems with some errors. • Analyze data from two groups, incompletely or inaccurately. • Can describe the risks and benefits of a given situation.
BELOW STANDARD	• Identify some key features of related models, but are unable to apply them. • Do not identify the key features in a model which can be used to predict change in real world situations. • Identify natural cycles within systems. • Cannot analyze and compare data from two groups. • Are unable to describe the risks and benefits of a situation.

Science Performance Level Descriptors
Processes and Skills
Grade 8

Content Standard 21.0	Scientific Values and Attitudes: **Students understand that science is an active process of systematically examining the natural world.**
EXCEEDS STANDARD	• Explain fully why it is critical to keep honest, clear and accurate records and do so. • Explain that hypotheses are valuable, even if they turn out to be incorrect, if they lead to fruitful investigations and can give examples drawn from the history of science. • Compare varying explanations given for a particular phenomena, event, or result and explain why it is not always possible to decide which, if any, is correct.
MEETS STANDARD	• Clearly state reasons for keeping honest, clear, and accurate records (e.g., maintaining integrity of the scientific process; mitigation of injury to persons, property, or the environment). • Explain that hypotheses are valuable even if they turn out to be incorrect. • Compare varying explanations given for a particular phenomena, event, or result.
APPROACHES STANDARD	• Are unclear about the importance of keeping honest, clear, and accurate records and their record keeping is uneven. • Have trouble understanding that hypotheses are valuable, even if they turn out to be incorrect, if they lead to fruitful investigations. • Occasionally misinterpret explanations given for a particular phenomena, event, or result.
BELOW STANDARD	• Do not grasp the importance of keeping honest, clear, and accurate records. • Do not understand that hypotheses are valuable, even if they turn out to be incorrect, if they lead to fruitful investigations. • Are unable to compare varying explanations given for a particular phenomena, event, or result.

Science Performance Level Descriptors
Communication Skills
Grade 8

Content Standard 22.0	Communication Skills: Students understand that a variety of communication methods can be used to share scientific information.
EXCEEDS STANDARD	• Write clear, detailed, step-by-step instructions for a complex procedure using flow charts as appropriate. • Organize information in tables and graphs in such a way that relationships are readily apparent; describe these relationships including essential but not extraneous detail. • Convincingly discuss scientific topics by paraphrasing, asking for clarification or elaboration, and expressing alternative positions using print, Internet and multi media resources.
MEETS STANDARD	• Write clear, step-by-step instructions for a procedure. • Organize information in tables and graphs and describe the relationships they reveal. • Discuss scientific topics by paraphrasing, asking for clarification or elaboration, and expressing alternative positions using print, Internet and multi media resources.
APPROACHES STANDARD	• Write confusing step-by-step instructions for a procedure. • Organize information in tables and graphs in a way that tends to obscure rather than reveal relationships; describe existing relationships in a confusing manner. • Discuss scientific topics superficially.
BELOW STANDARD	• Attempt to write step-by-step instructions for a procedure but omit critical steps or sequence steps incorrectly. • Cannot organize information in tables and graphs and describe the existing relationships without strong teacher support. • Have difficulty discussing scientific topics due to inaccurate paraphrasing, reluctance to ask for clarification or elaboration, and inability to express alternative positions.

Science Performance Level Descriptors
Processes and Skills
Grade 8

Content Standard 23.0	Scientific Applications of Mathematics: **Students understand that scientific inquiry is enhanced and often communicated by using mathematics.**
EXCEEDS STANDARD	• Explain that two quantities can be directly proportional to one another (i.e., one quantity increases as the other increases) or inversely proportional to one another, (i.e., one quantity increases as the other decreases); provide multiple examples of each kind of relationship; calculate answers to problems by substituting numerical values in algebraic equations based on simple direct or inverse relationships (i.e., a=bc) or a = b/c). • Explain, clearly and concisely, the steps required to arrive at a solution to a given problem and the purpose of each step. • Explain, that probabilities are ratios and can be expressed as fractions, percentages, or odds; estimate probabilities of outcomes in scientific investigations on the basis of prior trials or the number of possible outcomes. • Use the "input units" (e.g., seconds, square inches, miles per hour) to determine the proper unit for expressing the answer; convert compound units in scientific expressions (e.g., miles per hour into feet per second). • Explain the differences between precision and accuracy, using examples; decide what precision is adequate and round off the result of calculator operations to enough significant figures to reflect those of the inputs. • Synthesize data from related investigations carried out under similar conditions and use these to predict the outcome of an analogous investigation.
MEETS STANDARD	• Explain that quantities can vary in proportion to one another; provide examples (e.g., the mass of a substance is directly proportional to its volume; the time it takes a vehicle to travel is directly proportional to the distance traveled). • Can generally explain the steps required to solve a given problem and why they are necessary. • Explain, using examples, that probabilities are ratios and can be expressed as fractions, percentages, or odds; make reasonable estimates of outcomes in familiar situations (e.g., probability of being born a boy or girl, struck by lightening, involved in an automobile accident). • Explain that, with very few exceptions, numbers in science are expressed with units; consistently select and use the appropriate SI unit for a particular measurement (e.g., meters for length, seconds for time, kilograms for mass). • Define accuracy and precision; decide if repeated measurements and computations of quantities are reasonably precise and accurate and explain why. • Make reasonable predictions on the basis of all known data from related studies carried out under similar conditions.

Science Performance Level Descriptors

Grade: 8 (Standard 23.0 continued)

APPROACHES STANDARD	• Describe the concept of direct proportionality in vague terms or do not provide appropriate examples. • Have difficulty explaining the steps required to solve problems and why they are necessary. • Have difficulty explaining that probabilities are ratios and interpreting them as fractions, percentages, or odds; make unreasonable estimates of outcomes in familiar situations. • Inconsistently estimate probabilities of outcomes in familiar situations. • Do not clearly differentiate precision and accuracy and have difficulty applying these concepts to measurements and calculations. • Have difficulty synthesizing and applying data from related data investigations to predict the outcome of a new, analogous situation.
BELOW STANDARD	• Are unable to describe the concept of direct proportionality and provide examples. • Given a completed calculation, are unable to explain the purpose of each step. • Are unable to explain the meaning of probabilities or apply the concept to familiar situations. • Have limited success estimating probabilities of outcomes in familiar situations. • Frequently select and use an inappropriate SI unit for a particular measurement. • Are unable to differentiate and/or apply the concepts of precision and accuracy. • Are unable to make reasonable predictions even when presented with data from similar investigations.

Science Performance Level Descriptors
Processes and Skills
Grade 8

Content Standard 24.0	Laboratory Skills and Safety: **Students can appropriately and safely apply the tools and techniques of scientific inquiry.**
EXCEEDS STANDARD	• Consistently use instruments and laboratory safety equipment properly and assist others to do so. • Consistently handle and dispose of chemicals according to established standards, and anticipate potential hazards. • Choose appropriate materials for making or repairing simple mechanical constructions and use the materials in an innovative, effective way. • Keep accurate, organized records of scientific investigations that can be readily followed by others. • Use appropriate technology in laboratory procedures for measuring, recording, storing, and analyzing data effectively and efficiently. • Design and independently carry out a controlled experiment.
MEETS STANDARD	• Consistently use instruments and laboratory safety equipment properly. • Consistently handle and dispose of chemicals according to established standards. • Choose appropriate, available materials for making or repairing simple mechanical constructions (e.g., designing an apparatus using simple machines). • Keep accurate, organized records of scientific investigations. • Use appropriate technology in laboratory procedures for measuring, recording, storing, and analyzing data (e.g., computers, graphing calculators, probes). • Design and carry out a controlled experiment working in a small group.
APPROACHES STANDARD	• Use instruments and laboratory safety equipment properly, when prompted. • Require constant reminders to adhere to established standards while handling and disposing of chemicals. • Make inappropriate choices of materials for making or repairing simple mechanical constructions, due to insufficient knowledge of the material's properties and/or the nature of the task. • Keep records that may be inaccurate and are organized in a way that makes them difficult to follow. • Sometimes fail to match the technology to the task and/or use the technology correctly. • Can explain what is meant by a controlled experiment but can design one only with considerable teacher support.
BELOW STANDARD	• Do not know how or fail to use instruments and laboratory safety equipment properly. • Require constant supervision in order to prevent injury to self or others while handling and disposing of chemicals. • Have considerable difficulty in choosing appropriate, available materials for making or repairing simple mechanical constructions. • Keep records of scientific investigations that are frequently inaccurate and slipshod. • Use technology inappropriately and incorrectly in laboratory procedures for measuring, recording, and analyzing data. • Have little success in explaining and designing a controlled experiment.

Science Performance Level Descriptors
Physical Science
Grade 12

Content Standard 1.0	**Forces and Motion:** Students understand that forces such as gravitational, electrical, and magnetic influence the motion of objects.
EXCEEDS STANDARD	• Use the Laws of Motion to correctly predict the motion of an object and design a workable model to explain or demonstrate the Laws of Motion (e.g., catapult, mousetrap car, bottle rocket). • Explain the role of gravity in such phenomena as tides, planetary orbits, apparent weightlessness in space, and comet orbits. Accurately calculate the motion of falling objects. • Correctly predict and demonstrate which simple machine would be most efficient in a given situation. • Calculate force, pressure, and area in a wide variety of given situations (P = F/A) and use this relationship to explain phenomena, such as the behavior of gases and water pressure. • Design a functional electromagnetic system given certain specifications (e.g., electric motor, electric circuit, radio transmitter).
MEETS STANDARD	• Use the Laws of Motion to correctly predict the motion of an object. • Describe changes in the force of gravity based on different masses and distances. Apply the principle of gravity to the motion of falling objects (e.g., objects accelerate as they fall). • Determine the mechanical advantage and efficiency of various simple machines, (i.e., screw, lever, pulley, wheel, axle, and wedge) and evaluate the usefulness of various machines according to their function, efficiency, and mechanical advantage. • Explain and apply the relationship between force, pressure, and area (P = F/A) to common phenomena (e.g., the gas pressure change in an expanding container or the pressure differences between sharp and dull objects); investigate and describe the relationship between pressure and depth in a liquid. • Describe or explain the relationship between electromagnetic forces and electromagnetic systems (e.g., generators, circuits, electric motors). Calculate variables for simple electromagnetic systems (i.e., current, resistance, wattage, voltage). Investigate and describe that the electromagnetic spectrum (including radio waves, light, infrared, etc.) is a form of energy consisting of both electrical and magnetic energy.

Science Performance Level Descriptors
Physical Science
Grade: 12 (Standard 1.0 continued)

APPROACHES STANDARD	• State the Laws of Motion, but, are unable to consistently apply them. • Are able to explain that the force of attraction between two objects is proportional to the product of the masses and inversely proportional to the square of the distance between them, but have difficulty calculating resulting forces. • Explain mechanical advantage and efficiency and how they pertain to various simple machines, but cannot apply them and arrive at numerical solutions to problems. • Explain the relationship between force, pressure, and area ($P = F/A$) but cannot apply it. • Explain how electric motors and generators illustrate the relationship between electricity and magnetism but have difficulty calculating variables for simple electromagnetic systems.
BELOW STANDARD	• Cannot state or apply the Laws of Motion. • State that a force of attraction exists between objects, but are unable to apply the relationship to solve simple problems between the force, mass, and distance. • Cannot explain mechanical advantage and efficiency and how they apply to various simple machines even with assistance. • Cannot explain the relationship between force, pressure, and area ($P = F/A$). • Cannot explain the relationship between electricity and magnetism and how it applies to generators, circuits, electric motors; cannot calculate variables for simple electromagnetic systems.

Science Performance Level Descriptors
Physical Science
Grade 12

Content Standard 2.0	Structure and Properties of Matter: **Students understand that materials have distinct properties which depend on the amount of matter present, its chemical composition, and structure.**
EXCEEDS STANDARD	• Investigate and describe two intrinsic properties (i.e., density and solubility); quantitatively define density and molar, molal and normal solutions; manipulate the respective algebraic relationships to solve problems; calculate new concentrations of diluted solutions. • Identify different substances and concentrations based on their characteristic absorption and/or emission spectra and explain the theoretical basis for the techniques. • Discuss the theoretical foundation behind chemical bonding using concepts such as electronegativity. Predict the type of bond (i.e., polar covalent, nonpolar covalent, ionic, metallic) that will form between given atoms. Relate bond type to macroscopic properties. • Summarize the major features of the quantum mechanical model of atomic structure and the evidence supporting it; identify quantum numbers, sublevels, and orbitals; write the electronic configuration for neutral atoms with atomic numbers 1-20 and relate it to their reactivity; interpret Columb's Law quantitatively and relate the attraction of a nucleus for its electrons to properties such as ionization energy and electronegativity. • Construct a model or diagram and use the Kinetic Molecular Theory and forces of attraction (e.g., hydrogen bonding, Van der Waal's forces) between particles to explain the phases of matter and their properties. • Construct models or diagrams to depict various carbon based molecules including simple organic structures for alkanes, alkenes, alkynes, aromatic hydrocarbons (benzene), alcohols, carboxylic acids, and amino acids.
MEETS STANDARD	• Investigate and describe intrinsic (e.g., color, odor, density) and extrinsic (e.g., mass, volume) physical properties of matter. • Apply techniques of spectral analysis (e.g., flame tests, colorimetry, etc, to the identification of elements and compounds. • Distinguish among and describe various types of chemical bonds (e.g., covalent, ionic, and metallic). • Describe the major features of the quantum-mechanical model of atomic structure including the concepts of the probable locations of electrons, discreet energy levels, quantum numbers, and electron configurations. • Apply the Kinetic Molecular Theory and the concept of forces between particles to explain phase changes and the properties of the states of matter. • Explain how carbon atoms uniquely bond to one another to form a large variety of molecules as well as those necessary for life.

Science Performance Level Descriptors
Physical Science
Grade: 12 (Standard 2.0 continued)

APPROACHES STANDARD	• Describe the difference between intrinsic and extrinsic properties, with examples, but cannot work simple problems involving density or molarity. • Make substantive errors when using techniques of spectral analysis to identify elements and compounds and colorimetric methods to determine the concentrations of analytes in a solution. • Are unable to distinguish accurately among and describe various types of chemical bonds. • List some essential features of the quantum-mechanical model of atomic structure but are unable to relate these to the behavior of elements; cannot explain why the nucleus of an atom and its electron(s) stay together. • Describe some of the essential features of the Kinetic Molecular Theory and the concept of forces between particles but have difficulty in relating these to the properties of the phases of matter. • Are unable to completely explain how carbon atoms can bond to one another to form a large variety of molecules including those necessary for life.
BELOW STANDARD	• Are unable to identify properties as extrinsic or intrinsic and are unable to describe solutions in terms of molarity, molality, normality. • Are unable to use techniques of spectral analysis and colorimetric methods. • Are unable to identify or list various bond types. • Are unable to describe the currently accepted model of the atom. • Are unable to describe the essential features of Kinetic Molecular Theory. • Are unable to describe how carbon atoms combine.

Science Performance Level Descriptors
Physical Science
Grade 12

Content Standard 3.0	Energy and Matter: Interactions and Forms: **Students understand that changes in temperature and pressure can alter states of matter. Energy exists in many forms, and one form can change into another.**
EXCEEDS STANDARD	• Calculate the loss of energy, as energy is transformed or transferred, for a specific system and the resulting effect. • Interpret phase diagrams to identify physical state. • Calculate various wave characteristics and properties of wave travel (i.e., velocity, angle of reflection, superposition). • Analyze and calculate current, voltage, and resistance in various electrical circuits (i.e., parallel, series, and combination). • Calculate the mass or energy required to transform one into the other ($E=mc^2$); relate ($E=mc^2$) to nuclear fission. • Demonstrate with a simple model, such as a checker game, the concept of increasing entropy; apply the concept to chemical and physical changes and show it can be countered by changes in heat (entropy).
MEETS STANDARD	• Explain, using multiple examples, that any energy transfer or transformation results in some "loss" of energy in the form of heat which may spread by radiation, conduction, or convection. • Investigate, using first hand observations, and explain that pressure may affect changes of state. • Investigate, using first hand observations, and describe how waves can superimpose on one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change directions when entering a new material. • Investigate, using first hand observations, and describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy. • Investigate, using first hand observations, (e.g., data on conservation of momentum, predictions of projectile motion, careful measurements and calculations of transfer between potential and kinetic energy) how matter and energy may be changed and energy can be transferred in many ways; describe the conservation of mass-energy as it applies to a closed system ($E=mc^2$). • Describe the concept of entropy as it applies to a closed system, identifying the tendency for disorder to increase; given examples of chemical and physical changes, state which is favored by entropy.

Science Performance Level Descriptors
Physical Science
Grade: 12 (Standard 3.0 continued)

APPROACHES STANDARD	• State that any energy transfer or transformation results in some "loss" of energy in the form of heat which may spread by radiation, conduction, or convection, but are unable to give appropriate examples. • Are unable to describe that pressure may affect changes of state and/or that changes in pressure affect solids, liquids, and gases differently. • Are unable to correctly describe the basic characteristics of waves and wave motion. • Are unable to correctly characterize simple electrical circuits in terms of current, resistance, and voltage. • Are unable to correctly describe the conservation of mass-energy as it applies to a closed system. • Are unable to describe the concept entropy and/or provide an appropriate example.
BELOW STANDARD	• Cannot explain or predict that some energy will be "lost" in any transfer or transformation. • Are unable to identify a relationship between pressure and change of state and/or the effects of pressure on solids, liquids, and gases. • Are unable to identify basic characteristics of waves. • Are unable to identify components of an electrical circuit. • Are unable to identify any relationship between mass and energy. • Are unable to define entropy.

Science Performance Level Descriptors
Physical Science
Grade 12

Content Standard 4.0	**Chemical Reaction:** Students understand that chemical reactions change substances into different substances.
EXCEEDS STANDARD	• Given reactants in a chemical change, predict likely products and write a balanced equation; use the information a balanced equation conveys to solve various Stoichiometric problems. • Quantitatively describe the way in which various factors affect the rate of a chemical reaction (i.e., temperature, particle size, pressure, presence of a catalyst, pH, concentration of reactants); relate the effects to what is taking place at the molecular level. • Describe the energy involved in a chemical reaction using the concepts of heats of reaction, heats of formation and entropy. • Describe the types of bonds that an atom may form as a result of its electron configuration (e.g., use hybrid orbital to describe various carbon bonds) and the shapes of the resulting molecules.
MEETS STANDARD	• Write a balanced equation to describe a given chemical reaction and describe the information it conveys. • Qualitatively describe the way in which various factors affect the rate of a chemical reaction (i.e., temperature, particle size, pressure, presence of a catalyst, pH, concentration of reactants). • Distinguish between endothermic and exothermic reactions (i.e., redox reactions, burning fuel, photosynthesis, respiration, electrochemical reactions in batteries). • Relate the chemical reactivity of an element to its electron configuration; illustrate with appropriate diagrams and examples.
APPROACHES STANDARD	• With assistance, write a balanced equation to describe a given chemical reaction. • Describe incompletely or somewhat inaccurately the way in which various factors, which affect it. • Inconsistently relate the release or consumption of energy to chemical reactions. • Inconsistently relate the chemical reactivity of an element to its electron configuration.
BELOW STANDARD	• Are unable to balance a chemical equation. • Are unable to identify a relationship between reaction rate and factors such as temperature, particle size, pressure, presence of a catalyst, pH, and concentration of reactants. • Are unable to identify a relationship between energy release or consumption and chemical reactions. • Are unable to identify any relationship between chemical properties and electron configuration.

Science Performance Level Descriptors
Physical Science
Grade 12

Content Standard 5.0	Nuclear Energy and Electromagnetic Energy: **Students understand that nuclear energy and electromagnetic energy are produced from both natural and human-made sources in many forms.**
EXCEEDS STANDARD	• Calculate focal points, size of objects, and location of objects. • Write nuclear equations for the radioactive decay of specified isotopes given their mode of decay (i.e., alpha, beta, and gamma emission); calculate the age of a material, its half-life, or the amount of material remaining after a specified time period. • Describe key political, economic, scientific and environmental aspects of nuclear waste disposal. • Draw the electromagnetic spectrum on a logarithmic scale, labeling principle regions. • Calculate mass defect and explain typical origins of radiation in each region. • Research and make a case for or against peacetime uses of nuclear energy.
MEETS STANDARD	• Use lenses to demonstrate the interaction of light with matter (e.g., reflection, refraction); diagram converging and diverging lenses and describe major applications. • Estimate the age of some materials using predictable rates of nuclear reaction (i.e., half-lives). • Describe the differences in disposal techniques that are required for high-and low-level nuclear wastes. • Describe electromagnetic spectrum labeling principle regions (e.g., gamma rays, x-rays, visible light, UV, IR, radio waves). • Communicate that the strong nuclear force that holds the nucleus together is greater than the weak forces that would tend to break it apart. • Describe the release of energy during the nuclear processes of fission and fusion and give examples of elements that undergo fission and fusion respectively; compare the amount of energy in fission and fusion with that in chemical and phase changes.
APPROACHES STANDARD	• Can use lenses to demonstrate with some inaccuracies the interaction of light with matter but are unable to distinguish between converging and diverging lenses. • Explain the concept of half-life and estimate, with occasional mistakes, the age of materials. • Inadequately distinguish between disposal techniques for high- and low-level nuclear waste. • Unable to partially describe the electromagnetic spectrum. • Unable to clearly describe the interaction of forces within the nucleus. • Have difficulty differentiating clearly between fission and fusion or describing the magnitude of the energy released.

Science Performance Level Descriptors
Physical Science
Grade: 12 (Standard 5.0 continued)

BELOW STANDARD	• Are unable to demonstrate the interaction of light with matter using lenses. • Are unable to explain half-life or use it to estimate the age of material. • Are unable to identify the difference between high- and low-level nuclear waste. • Are unable to describe the electromagnetic spectrum. • Are unable to distinguish between different forces within the atom. • Are unable to describe fission and fusion accurately.

Science Performance Level Descriptors
Life Science
Grade 12

Content Standard 6.0	Structure and Function: **Students understand that all life forms, at all levels of organization, use specialized structures and similar process to meet life's needs.**
EXCEEDS STANDARD	• Correctly explain the concept of equilibrium in organisms as related to disease processes and can provide accurate examples of specific disruptions (e.g., fever inflammation processes). • Accurately distinguish among the systems of the human body and describe the different cells of each (e.g., skeletal, nervous, digestion, etc.). • Independently and accurately trace digestion, absorption, and use of a food or group of foods, through an organism, and can provide specific examples. • Accurately describe photosynthesis and provide supporting diagrams, models or illustrations.
MEETS STANDARD	• Explain the concept of equilibrium in organisms as related to disease processes with minor errors. • Distinguish among the systems of the human body (e.g., skeletal, nervous, digestive, etc.), and can describe the different cells of each with minimal assistance. • Trace with assistance the digestion, absorbtion, and use of a food or group of foods through an organism. • Reasonably explain the process of photosynthesis.
APPROACHES STANDARD	• Demonstrate some general understanding of equilibrium in living systems but are not clear on the connections with disease processes. • Can trace the digestion, absorbtion, and use of a food through an organism, with significant assistance, and explanation lacks detail. • Provide a description of photosynthesis that lacks necessary details.
BELOW STANDARD	• Demonstrate an inadequate understanding of equilibrium in living systems. • Are unable to distinguish between the major systems of the human body or the different cells associated with each. • Exhibit only a rudimentary knowledge of digestion, absorbtion, and use of foods in organisms, can trace digestion of foods through an organism, with major mistakes. • Provide a description of photosynthesis that is missing major concepts.

Science Performance Level Descriptors
Life Science
Grade 12

Content Standard 7.0	Internal and External Influences on Organisms: **Students understand that organisms respond to internal and external influences.**
EXCEEDS STANDARD	• Cite convincing evidence and give examples of behavior patterns that contribute to survival of a species. • Give multiple examples with clear explanations of responses to an environmental change that enhances the chance of survival of specific plants and animals. • Diagram and explain how the nervous system influences behavior in multicellular animals. • Investigate, using print and electronic resources, and explain, using diagrams and drawings, how certain viral diseases destroy critical cells of the immune system and summarize promising lines of research to combat such diseases. • Accurately give specific examples of how certain viral diseases destroy critical cells of the immune system.
MEETS STANDARD	• Relate behavior patterns to survival of a species by providing some examples. • Give examples of a response in a plant and an animal to an environmental change that enhances its chance of survival. • Describe the role of the nervous system in receiving input and generating responses in multicellular animals. • Develop a presentation, suitable for middle school students, which explains how the immune system works and how AIDS, a viral disease, destroys critical cells, thereby making the body vulnerable to infectious agents and cancerous cells.
APPROACHES STANDARD	• Relate given behavior patterns to survival of a species. • Provide examples which lack clear connections between the organisms response and the chance of survival. • Inadequately describe the role of the nervous system in receiving input and generating responses in multicellular animals. • Make limited connections between viral diseases and their negative impact upon the immune system.
BELOW STANDARD	• Are unable to relate behavior patterns to survival of species. • Make no connection between an organism's response, to an environmental change, and the chance for survival. • Describe the role of the nervous system in receiving input and generating responses in multicellular animals, but description is erroneous or lacks essential information. • Make no connection between diseases and the immune system.

Science Performance Level Descriptors
Life Science
Grade 12

Content Standard 8.0	Heredity and Diversity: **Students understand that life forms are diverse, and that they pass some characteristics to their offspring.**
EXCEEDS STANDARD	• Can discuss the biological, ethical, and ecological implications of DNA biotechnology (e.g., cloning, frozen embryos, genetic engineering). • Defend the practice of using similarities in DNA sequence to classify organisms. • Evaluate genetic combinations for evidence of independent assortment and recombination of genes (e.g., evaluation of pedigrees). • Describe how expressed traits are controlled by DNA. • Independently demonstrate how multiple pairs of genes may control patterns of inheritance. • Propose an environmental change and give examples of how diversity and variation would help a species to survive. • Provide several examples of influences which may cause gene mutations, and cite evidence that mutations occur randomly at low rates.
MEETS STANDARD	• Explain, in general terms, that all body cells in an organism are developed from a single set of genetic information and that different parts of the instruction are used in different kinds of cells. • Explain, using diagrams and/or charts, how similarity of DNA sequences can be used to estimate the degree of relatedness among organisms. • Relate the great variety of possible gene combinations to sexual reproduction. • Explain how DNA provides instructions for assembling proteins. • Demonstrate how multiple pairs of genes may control patterns of inheritance with minor errors. • Point out, with some examples, how diversity and variation of organisms increase the chance of survival when environmental conditions change. • Describe how a variety of influences may cause gene mutations.

Science Performance Level Descriptors
Life Science
Grade: 12 (Standard 8.0 continued)

APPROACHES STANDARD	• Provide an explanation that all body cells in an organism are developed from a single set of genetic information and that different parts of the instruction are used in different kinds of cells, that is simplistic and lacks important detail. • Provide partial explanation, regarding how similarity of DNA sequences can be used to estimate the degree of relatedness among organisms. • Do not make clear connection between sexual reproduction and gene combinations. • Explain, with some errors and/or omissions, how DNA provides instructions for assembling proteins. • Have difficulty demonstrating how multiple pairs of genes may control pattern of inheritance. • Give limited or weak examples of how diversity and variation of organisms increase the chances of survival when environmental conditions change. • Provide a limited description of how a variety of influences may cause gene mutations.
BELOW STANDARD	• Provide explanation that all body cells in an organism are developed from a single set of genetic information and that different parts of the instruction are used in different kinds of cells that is missing major parts or contains major errors. • Exhibit major misconceptions in explanation of using DNA sequence data to classify organisms. • Has major misconceptions about genetic variations and gene combinations. • Describes DNA's role in providing instruction for assembling proteins, incompletely and erroneously. • Have major misconceptions of how multiple pairs of genes may control patterns of inheritance. • Have difficulty explaining how diversity and variation of organisms increase the chances of survival when environmental conditions change. • Inadequately describe that a variety of influences may cause gene mutations.

Science Performance Level Descriptors
Life Science
Grade 12

Content Standard 9.0	Evolution-The Process of Biological Change: **Students understand that life forms change over time.**
EXCEEDS STANDARD	- Provide well-developed multiple examples that illustrate the basic concepts underlying the theory of evolution. - Examine the fossil records of ancient life forms, apply the theory of natural selection and illustrate its evolutionary consequences with appropriate examples. - Simulate and explain how the adaptation of a species can occur over many generations because of the unique characteristics that favor those individuals in an environment. - Develop and explain with examples, the multiple lines of evidence that support the theory of evolution, i.e., molecular, embryological and structural. - Provide multiple examples of species that have become extinct and probable reasons for their distinction and explain human interventions to aid endangered species today. - Investigate and explain using examples, how the process of evolution is driven by genetic and environmental influences. - Summarize evidence supporting the development of organisms from single cell to multicellular organisms and explain, using models and/or diagrams, how the process likely occurred.
MEETS STANDARD	- Explain the basic concepts underlying the theory of evolution. - Investigate and apply the concept of natural selection to explain incremental changes in the fossil record, using an example such as Eohippus. - Relate adaptations of a species and those unique characteristics that favor an organism in a particular environment and use Kettlewell's study of England's peppered moths as an example of natural selection. - Recognize there are various lines of evidence which are used to establish evolutionary relationship among species. - Explain why most species that ever lived are extinct and why many human beings are concerned that endangered species be preserved. - Provide examples of genetic and environmental influences, that drive the process of evolution. - Cite evidence that cells with nuclei existed over 1 billion years ago and that these cells were the precursors to increasingly complex organisms.

Science Performance Level Descriptors

Life Science

Grade: 12 (Standard 9.0 continued)

APPROACHES STANDARD	• Provide an explanation of basic concepts underlying the theory of evolution that requires further development. • Have difficulty relating natural selection to the fossil record, with some assistance. • Recount the study of the moths of England, but have difficulty explaining its significance. • Display some knowledge of various lines of evidence which are used to establish evolutionary relationship among species. • Have difficulty reconciling the fact that most species that ever lived are extinct, with concern for current day extinctions. • Have difficulty explaining genetic and environmental influences on evolution. • Cite evidence with significant omissions or errors that cells with nuclei existed over 1 billion years ago and these cells were the precursors to increasingly complex organisms.
BELOW STANDARD	• Are unable to describe the basic concepts underlying the theory of evolution. • Have difficulty explaining how natural selection works and that we see evidence of it in the fossil record. • Make fragmented, incorrect connections between adaptations of a species and characteristics that favor survival in an environment. • Are unable to describe various lines of evidence which are used to establish evolutionary relationship among species. • Do not characterize extinction as a common process. • Do not connect genetic and environmental influences to evolution. • Demonstrate only rudimentary understanding that cells with nuclei existed over 1 billion years ago and these cells were the precursors to increasingly complex organisms.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 12

Content Standard 10.0	**Earth Structures and Composition:** Students understand that the Earth is composed of interrelated systems of rocks, water, air, and life.
EXCEEDS STANDARD	• Give a comprehensive explanation of the environment of origin of a sample of a rock, on the basis of obvious structure and mineral composition (e.g., specific environment of deposition for a sedimentary rock, above-versus below-ground formation for an igneous rock); explain why the properties of various earth materials make them valuable for specific uses (e.g., metals conduct heat and electricity, gypsum is lightweight, petroleum can be made into many different products). • Infer the model of continental drift from evidence (e.g., shapes of continents that fit together; mountain ranges, fossils of land-living organisms, and other geologic features that correlate across oceans). • Provide detailed descriptions of how the Earth is layered internally from densest material (nickel-iron) outward to the least dense (silicon-rich rocks), in the same way that liquids of varying densities will become layered with the densest material at the bottom; provide detailed descriptions of how the crust of the Earth is layered in varying ways (e.g., stratigraphy, water tables); and extend this reasoning to the Earth's atmosphere. • Identify the place of origin and describe the probable history of development of soil samples from various locations on the basis of properties and composition of each sample. • Research, using laboratory, print, multimedia, and Internet resources, the effects of historical and present-day changes in the composition of Earth's atmosphere; document qualitative and quantitative changes. • Communicate, using print, maps, models, or multimedia resources, thorough descriptions of the events that formed state and local geologic features.

Science Performance Level Descriptors
Earth and Space Sciences
Grade: 12 (Standard 10.0 continued)

MEETS STANDARD	• Describe the general processes of formation of a given sample of rock (i.e., weathering/eroision/ deposition, melting, heat/pressure); list uses for at least five common earth materials (e.g., gypsum in drywall, metals in electrical devices). • Explain the formation of some topographical features (e.g., volcanoes, rift valleys, ocean trenches, fault-block mountains) in terms of moving lithosphere plates. • Explain how the Earth is generally layered from the most dense material (solids - rocks) outward to less dense materials (liquids - oceans, lakes, streams) with the outermost layer being least dense (gases – the atmosphere). • Describe the origin of constituents in various samples of soil (e.g., organic materials came from decomposed plants and animals; mineral materials came from weathered rock); compare and contrast composition and properties of different soil horizons. • Describe, citing print, multimedia, or Internet resources, some historical changes in Earth's atmosphere (e.g., the change from a predominantly methane/ammonia atmosphere to today's composition); and describe, citing print, multimedia, or Internet resources, present-day changes in Earth's atmosphere (e.g., increase in carbon dioxide, ozone depletion, air pollution). • Compare and contrast, using maps, models, photographs, and/or field observations, large geologic features throughout the state (e.g., basin and range fault-block mountains, Sierra batholiths); compare and contrast, using maps, models, photographs, and/or field observations, specific local geologic features (e.g., glacial features in Lamoille Canyon, local beach benchmarks from ancient lakes, thrust faults in the Spring Mountains).
APPROACHES STANDARD	• Describe some of the structures and compositions found in rocks, but have difficulty relating those descriptions to the formation of those Earth materials. • Demonstrate partial understanding that landforms may result from movements in the Earth's crust (i.e., earthquakes, volcanic eruptions), but explanations fail to communicate the large-scale regional or global model of lithosphere plate movement. • Give somewhat inconsistent and inaccurate descriptions of the layering in, on, and above the Earth's surface. • Give some incomplete or inaccurate descriptions of soil samples; comparisons of different soil horizons lack necessary details. • Give some unrealistic or misleading descriptions of past and present changes in Earth's atmosphere. • Give descriptions of local and state geological features that lack necessary detail.

Science Performance Level Descriptors
Earth and Space Sciences
Grade: 12 (Standard 10.0 continued)

BELOW STANDARD	• Demonstrate limited understanding and provide inaccurate descriptions of the properties, origins, and uses of Earth materials. • Are unable to explain the formation of topographical features in terms of movements in the Earth's crust. • Give meager, and often inaccurate, descriptions of the layering in, on, and above the Earth's surface. • Provide mostly inaccurate and incomplete descriptions of soil samples, and have little success in making comparisons of different soil horizons. • Give mostly inaccurate descriptions of past and present changes in Earth's atmosphere. • Give insufficient descriptions of local and state geological features.

Performance Level Descriptors
Earth and Space Sciences
Grade: 12

Content Standard 11.0	Earth Models: **Students understand that the Earth may be represented by a variety of maps and models.**
EXCEEDS STANDARD	• Draw a topographic profile on paper or model a 3-dimensional surface on a computer based on data from a contour map. • Define a location in the sky in terms of azimuth and altitude.
MEETS STANDARD	• Construct a contour map of a simple model landform; build a model landform from a simple contour map. • Define a location on the Earth in terms of latitude and longitude to the precision of degrees, minutes, and seconds; determine the time in any time zone given the time of day in any other time zone.
APPROACHES STANDARD	• Construct a contour of a simple model landform, with some errors; build a model landform, with some inaccuracies, from a simple contour map. • Define, with slight imprecision, a location on the Earth in terms of latitude and longitude to the precision of degrees, minutes, and seconds; attempt to determine the time in any time zone given the time of day in any other time zone.
BELOW STANDARD	• Construct a contour map of a simple model landform, with major errors; build, with major inaccuracies, a model landform from a simple contour map. • Are unable to define a location on the Earth in terms of latitude and longitude or to determine the time in any time zone given the time of day in any other time zone.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 12

Content Standard 12.0	**Earth History:** Students understand that Earth systems (such as weather and mountain formation) may change or vary.
EXCEEDS STANDARD	• Extensively analyze, using Internet, print, and audio-visual materials, the causes and effects of five both recent and ancient examples of catastrophic geologic events. • Examine actual or graphical representations of rock sequences to infer geologic history (e.g., cross-cutting, fossil, structural, erosional, and superpositional relationships). • Determine the age of a geologic or cultural artifact using actual or simulated half-life or dendrochronology data.
MEETS STANDARD	• Analyze the causes, using Internet, print, or audio-visual materials, and describe two both recent and ancient examples of catastrophic geologic events. • Create a representation of a stratigraphic column based on actual or photographic data which represents rock sequences and unconformities (erosion surfaces). • Compare and contrast the variety of methods by which geologic time is determined (e.g., radioactive dating, dendrochronology, stratigraphy, and faunal succession)
APPROACHES STANDARD	• Investigate, using Internet, print, or audio-visual materials, and incompletely describe two both recent and ancient examples of catastrophic geologic events. • Create a partially complete representation of a stratigraphic column based on actual or photographic data which represents rock sequences and unconformities. • Compare and contrast the variety of methods by which geologic time is determined, but aspects of the analysis are incomplete or erroneous.
BELOW STANDARD	• Investigate, using Internet, print, or audio-visual materials, and insufficiently describe both recent and ancient examples of catastrophic geologic events. • Create a representation of a stratigraphic column, which is inaccurate and missing major parts. • Are unable to identify and adequately describe the essential features of major methods used to determine geologic time.

Science Performance Level Descriptors
Earth and Space Sciences
Grade 12

Content Standard 13.0	**Cycles of Matter and Energy:** Students understand that Earth systems have a variety of cycles through which energy and matter continuously flow.
EXCEEDS STANDARD	• Compare and contrast Earth's three major sources of energy and how they influence cycles of matter and energy in and on the surface of the Earth. • Describe extensively the relationships between ocean currents and global climate. • Analyze, using technology, the abiotic characteristics (pH, total dissolved solids, dissolved oxygen) of a river or stream and correlate those observations to geologic or cultural features found upstream. • Explain in detail how paleoclimatologists infer past climatic changes from evidence gathered from fossils, rocks, and glacial ice. • Make reasonable predictions as to how a disruption of a portion of Earth's system of cycles (rock, carbon, nitrogen) would affect the physical and biological components of those cycles and explain their rationale. • Explain extensively, using diagrams or animated multimedia presentations, the global system of the cycles of rocks, carbon and nitrogen, including details of living and nonliving components of these cycles as appropriate. • Analyze in detail current proposals of global warming and how predicted changes may affect social, economic, and environmental conditions regionally and globally. • Calculate, using experimental data, the rate of movement of a lithosphere plate, and extrapolate relative plate positions for a million or more years into the future.

Science Performance Level Descriptors
Earth and Space Sciences
Grade: 12 (Standard 13.0 continued)

MEETS STANDARD	• Explain that Earth systems have two major internal sources of energy (decay of radioactive isotopes and gravitational energy) and one major external source (the sun), all of which create heat and link these respectively to their major effect. • Observe and describe convection currents formed by heating water in a container; explain, using diagrams and citing first-hand observations, how uneven heating of the Earth's surface from the sun forms convection currents within the atmosphere and ocean, producing wind and ocean currents that are modified by the Earth's rotation. • Investigate water's unusual ability to dissolve a wide range of substances and explain, using diagrams and citing first-hand observations, how water dissolves minerals and gases as it passes through the water cycle and carries them to oceans and lakes. • Describe, using diagrams or multimedia presentations, how global climate is determined primarily by the conversion of light and ultraviolet energy to infrared radiation at and near the Earth's surface; describe how relatively small changes in solar output may have contributed to large changes in the Earth's climate in the past (e.g., ice ages, interglacial periods). • Explain how large-scale, long-term equilibrium can accommodate small-scale changes, citing specific examples such as: • a relatively small disruption (e.g., fire, landslide, flood) of a large ecosystem may disturb patterns, (e.g., food webs, cycles of matter) found in that ecosystem, but over time new patterns may form or old patterns may re-establish; • a regional disruption of climate (e.g., El Niño) may cause global changes in weather, but it may not have a significant impact on climate over long periods of time (i.e., hundreds or thousands of years). • Explain, using diagrams or animated multimedia presentations, the global system of the cycles of rocks, carbon, and nitrogen, including living and nonliving components of these cycles as appropriate. • Describe the model of the greenhouse effect, including listing the various gases, which impede the transfer of long-wave radiation ("heat") from Earth into space; explain that the idea of global warming is based on observations subject to multiple interpretations and predictions, and is less certain than the model of the greenhouse effect, which is one component of the idea of global warming, but which is based on reproducible laboratory data. • Model, using multimedia software or other methods, and explain how the energy that propels the Earth's lithosphere plates is dominantly a result of nuclear processes deep in the Earth.

Science Performance Level Descriptors
Earth and Space Sciences
Grade: 12 (Standard 13.0 continued)

APPROACHES STANDARD	• Describe with minimal detail that Earth systems have two major internal sources of energy and one major external source, all of which create heat. • Observe and describe convection currents formed by heating water in a container, but have difficulty using the observed behaviors to explain how uneven heating of the Earth's surface from the sun forms convection currents within the atmosphere and ocean, and how these wind and ocean currents are further modified by the Earth's rotation. • Investigate water's ability to dissolve a wide range of substances, but give unclear or unsupported explanations of how water dissolves minerals and gases as it passes through the water cycle and carries them to oceans and lakes. • Provide an incomplete or confusing description of how global climate is determined primarily by the conversion of light and ultraviolet energy to infrared radiation at and near the Earth's surface; describe incompletely how relatively small changes in solar output may have contributed to large changes in the Earth's climate in the past. • Explain in vague terms or with inadequate illustrations, how large-scale, long-term equilibrium can accommodate small-scale changes. • Attempt to explain, using diagrams or animated multimedia presentations, the global system of the cycles of rocks, carbon and nitrogen, including living and nonliving components of these cycles as appropriate, but explanations lack essential detail and/or are confusing. • Describe the greenhouse effect incompletely and/or with some errors. • Have difficulty explaining the idea of global warming is based on observations subject to multiple interpretations relating it to the greenhouse effect, for which there is sounder evidence of the idea of global warming, but which is based on repeatable laboratory data. • Model inadequately or give an incomplete or faulty explanation of how the energy that propels the Earth's lithosphere plates is dominantly a result of nuclear processes deep in the Earth.
BELOW STANDARD	• Describe with insufficient detail and clarity that Earth systems have two major internal sources of energy and one major external source, all of which create heat. • Provide inadequate descriptions of convection currents formed by heating water in a container and are unable to explain coherently how uneven heating of the Earth's surface from the sun forms convection currents within the atmosphere and ocean, producing wind and ocean currents that are modified by the Earth's rotation. • Have difficulty describing the action of water as a solvent and relating it to the dissolution of minerals and gases in the water cycle. • Describe with major errors how global climate is determined and are unable to explain how relatively small changes in solar output may have contributed to large changes in the Earth's climate in the past. • Are unable to give coherent explanations of how large-scale, long-term equilibrium can accommodate small-scale changes. • Are unable to explain and relate the cycles of rocks, carbon, and nitrogen, to a global system. • Are unable to define the greenhouse effect and relate it to the idea of global warming. • Are unable to model and explain coherently how the energy that propels the Earth's lithosphere plates is dominantly a result of nuclear processes deep in the Earth.

Science Performance Level Descriptors
Earth and Space Science
Grade 12

Content Standard 14.0	**Earth and Space Sciences:** Students understand that the Earth is part of a planetary system within the Milky Way galaxy, which is part of the known universe.
EXCEEDS STANDARD	• Relate surface features on other planets to the processes which formed them; relate their respective masses to their physical properties. • Make simple quantitative predictions about the motion of planets using Kepler's laws of planetary motion. • Explain how stars produce energy and elements heavier than hydrogen from nuclear reactions, illustrate with appropriate balanced equations. • Describe the theoretical formation of the solar system. • Describe the opposing effects of gravity and nuclear processes in the evolution of stars. • Describe objects found outside the solar system (e.g., stars, quasars, pulsars, galaxies). • Apply physical laws qualitatively or quantitatively to real or hypothetical situations (e.g., explain how laws of Newton, Kepler, and relativity would impact travelers on a high-speed spaceship).
MEETS STANDARD	• Investigate, using print, multimedia, or Internet resources, and compare and contrast the Earth's atmosphere, water, temperature, and composition with those conditions on other planets. • Explain, using print or multimedia software, how most objects in the solar system are in regular and predictable motion, and relate that motion to such phenomena as the day, the year, phases of the moon, and eclipses. • Explain that stars produce energy and elements heavier than hydrogen from nuclear reactions. • Estimate the age of the universe as ten billion years and cite supporting scientific evidence. • Describe how increasingly sophisticated technology (e.g., mathematical models and computer simulations) is used to learn about the universe. • Explain that the physical laws (e.g., the laws of Newton, Kepler, thermodynamics, relativity, and quantum physics) appear to apply to all bodies in the universe.

Science Performance Level Descriptors
Earth and Space Sciences
Grade: 12 (Standard 14.0 continued)

APPROACHES STANDARD	• Investigate, using print, multimedia, or Internet resources, and compare and contrast the Earth's atmosphere, water, temperature, and composition with those conditions on other planets, but descriptions are somewhat incomplete or erroneous. • Attempt to explain, using print or multimedia software, how most objects in the solar system are in regular and predictable motion, and relate motion to such phenomena as the day, the year, phases of the moon, and eclipses, but explanations are confusing. • Attempt to explain that stars produce energy and elements heavier than hydrogen from nuclear reactions, but explanation is vague. • Estimate the age of the universe as ten billion years, but do not cite supporting scientific evidence. • Describe, within a narrow range, how increasingly sophisticated technology is used to learn about the universe. • Are unable to explain clearly the meaning of important physical laws and their applications to all bodies in the universe.
BELOW STANDARD	• Investigate atmosphere, water content, temperature, and composition of the planets, but make poor use of resources and produce comparisons that are incomplete and erroneous. • Are unable to describe how most objects in the solar system are in regular and predictable motion, and relate that motion to such phenomena as the day, the year, phases of the moon, and eclipses. • Cannot describe the source of stars' energy. • Do not describe the estimated age of the universe to be about ten billion years. • Describe vaguely how increasingly sophisticated technology is used to learn about the universe. • Are unable to explain satisfactorily the meaning of physical laws.

Science Performance Level Descriptors
Environmental Sciences
Grade 12

Content Standard 15.0	**Ecosystems: Students will demonstrate an understanding that ecosystems display patterns of organization, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.**
EXCEEDS STANDARD	• Analyze and describe how multiple changes in an ecosystem may affect biodiversity and contribute to an ecosystem's stability or instability. • Use a model or diagram to demonstrate how an ecosystem may change or remain the same in response to different kinds of influences. • Trace, using charts, graphs, or diagrams, the movement of particular elements through food webs and relate this movement to the carbon, nitrogen, and water bio-geochemical cycles; explain how matter is passed along in food chains that intertwine to form webs and how it can be recycled among components of the ecosystem. • Compare and contrast the geologic, hydrologic, climatic, and biological characteristics of Nevada's bioregions, giving extensive examples.
MEETS STANDARD	• Investigate and describe how changes in an ecosystem may affect biodiversity and contribute to an ecosystem's stability or instability, using specific examples. • Explain how an ecosystem may change or remain the same in response to different kinds of influences; contrast the immediate and long-term effects of a disaster (e.g., flood, fire) with those produced by a change in climate or introduction of a new species. • Interpret a food web showing how materials and energy are cycled through ecosystems. • Compare and contrast the geologic, hydrologic, climatic, and biological characteristics of Nevada's principal bioregions (e.g., Northern Nevada's cold desert, Southern Nevada's warm desert).
APPROACHES STANDARD	• Explain, in very general terms, how changes in an ecosystem may affect biodiversity and contribute to an ecosystem's stability or instability. • Describe, in a rudimentary way, how an ecosystem may change or remain the same in response to different kinds of influences. • Require assistance in interpreting a food web showing how materials and energy are cycled through ecosystems. • Describe gross differences in the geologic, hydrologic, climatic, and biological characteristics of Nevada's bioregions.

Science Performance Level Descriptors
Environmental Sciences
Grade: 12 (Standard 15.0 continued)

BELOW STANDARD	• Are unable to explain the relationship between biodiversity and an ecosystem's stability or instability. • Are unable to explain that an ecosystem might change or remain the same in response to different kinds of influences. • Are unable to relate food webs to how materials and energy are cycled through the environment. • Display limited understanding of differences in the geological, hydrologic, climatic, and biological characteristics of Nevada's bioregions.

Science Performance Level Descriptors
Environmental Sciences
Grade 12

Content Standard 16.0	**Natural Resources:** Students demonstrate and understand that natural resources include renewable and non-renewable materials and energy. All organisms, including human, use resources to maintain and improve their existence, and the use of resources can have positive and negative consequences.
EXCEEDS STANDARD	• Research, using print, multimedia, and/or Internet resources, and evaluate the positive and negative consequences of changing the way the nation uses a natural resource, including implications for individuals; develop an action plan identifying key steps to be taken to change the current pattern. • Evaluate the costs and benefits of the various processes involved in obtaining, using, and recycling a specific class of materials such as wood products, minerals, or plastics. • Investigate, using print, multimedia, or Internet resources, and use graphs, charts, and/or diagrams to describe trends in career opportunities associated with the study, exploration, extraction, utilization, protection, and restoration of natural resources. • Investigate, using simulations or models, the limitations of an Earth system's ability to respond to stresses produced by human or natural activities. • Predict the logical effects (e.g., on ecosystems, infrastructure, economies) that changes in human populations (e.g., population increase or decrease, patterns of migration) will cause in a local area or large region.

MEETS STANDARD	• Investigate, using print, multimedia, and/or the Internet, the positive and negative consequences of changing the way in which the nation as a whole and individuals use a natural resource (e.g., moving from fossil fuels to solar power might reduce air pollution, but would likely involve the extraction and use of Earth materials to make solar apparatus; recycling aluminum cans reduces the energy involved in extracting aluminum ore, but requires changing personal habits and creating new systems for recycling).
	• Investigate and describe the various processes involved in obtaining, using, and recycling a specific class of materials such as wood products, minerals, or plastics; cite environmental implications.
	• Investigate, using print, multimedia, or Internet resources, and describe the career opportunities associated with the study, exploration, extraction, utilization, protection, and restoration of natural resources.
	• Analyze and describe the limitations of Earth's ability to respond to several different kinds of stresses produced by human or natural activities. For example:
	  • excessive rates of groundwater removal can destroy an aquifer's ability to recharge
	  • channelization of mature rivers can change capacity for bioremediation by reducing the amount of wetland or marsh area the water normally passes through
	  • forest fire in marginally arable areas can, over the short or long term, reduce soil stability and increase erosion.
	• Analyze and evaluate the effects that changes in human populations have caused (e.g., resource depletion and environmental degradation with population increase; changes in ecosystems, both positive and negative, when human populations migrate), citing specific cases.

Science Performance Level Descriptors
Environmental Sciences
Grade: 12 (Standard 16.0 continued)

APPROACHES STANDARD	• Investigate in a cursory manner and/or conduct a superficial analysis of the positive and negative consequences of changing the way in which a natural resource is used. • Investigate and describe various processes involved in obtaining, using, and recycling a specific class of materials such as wood products, minerals, or plastic, but investigation, description, and application to the environment are weak. • Investigate, using print, multimedia, or Internet resources, and describe with insufficient detail opportunities associated with the study, exploration, extraction, utilization, protection, and restoration of natural resources. • Analyze and describe, with some errors, the limitations of Earth's ability to respond to stresses produced by human or natural activities. • Analyze and evaluate, with inconsistencies or errors, the effects that changes in human populations have caused.

BELOW STANDARD	• Do not locate essential information, and produce an analysis that fails to identify the positive and negative consequences of changing the way in which a natural resource is used. • Insufficiently investigate and describe with little success various processes involved in obtaining, using, and recycling a specific class of materials such as wood products, minerals, food, and manufactured objects. • Investigate with minimal understanding, using print, multimedia, or Internet resources, and describe, with little success, the career opportunities associated with the study, exploration, extraction, utilization, protection, and restoration of natural resources. • Analyze and describe incompletely or erroneously the limitations of Earth's ability to respond to several different kinds of stresses produced by human or natural activities. • Analyze incompletely and provide a meager evaluation of the effects that changes in human populations can cause.

Science Performance Level Descriptors
Environmental Sciences
Grade 12

Content Standard 17.0	Conservation: Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole, and future generations.
EXCEEDS STANDARD	• Compare two or more countries, one representative of an emerging country and one a fully industrialized country, on the basis of their energy consumption patterns, conservation efforts, and cultural practices, and summarize the resulting environmental impacts, using graphs, diagrams, and/or charts. • Compare and contrast a human impact with a natural impact (e.g., volcano eruption, asteroid collision) on the equilibrium of global systems. • Demonstrate that there is scientific uncertainty regarding many environmental issues, using appropriate examples and citing relevant research. • Discuss global actions that may affect Nevada's environment or economy and the impact of related trade-offs.
MEETS STANDARD	• Analyze the energy condition, conservation efforts, and societal behavior patterns of the U.S. • Discuss how human actions may impact the equilibrium of global systems. • Select a representative example and show how there can be scientific uncertainty regarding an environmental issue, due to its complexity or the length of time required to ascertain effects. • Provide examples of global actions that may affect Nevada's environment or economy and the impact of related trade-offs.
APPROACHES STANDARD	• Describe in general terms consumption patterns, conservation efforts, and cultural practices in terms of their environmental impacts. • Demonstrate some knowledge of how human actions may impact the equilibrium of global systems. • State that there is scientific uncertainty regarding many environmental issues but does not substantiate statement with convincing examples. • Are able to make only tenuous connections between global actions and Nevada's environment or economy.
BELOW STANDARD	• Describe in general, superficial terms consumption patterns, conservation efforts, and cultural practices and their respective environmental impact. • Discuss in rudimentary terms how human actions may impact the equilibrium of global systems. • Fail to analyze environmental issues sufficiently to detect the scientific uncertainty that exists. • Are unable to describe global actions that may affect Nevada's environment or economy.

Science Performance Level Descriptors
Processes and Skills
Grade 12

Content Standard 18.0	**Scientific, Historical, and Technological Perspectives:** Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole and future generations. (Nature of Science, Attributes of Scientific Research, The History of Science and Invention, Technology, The Dynamic Character of Scientific Knowledge, Scientific Ethics)
EXCEEDS STANDARD	• Model that the scientific way of knowing uses a critique and consensus process by communicating methods and procedures used in scientific investigations to a panel of teachers or to the public. • Investigate, using multiple sources, and concisely explain how public policy impacts the allocation of research monies. • Extensively investigate and explain, by recreating the proof, how scientific concepts that were originally challenged are now widely accepted. • Explain, with appropriate examples, that scientists work with others to resolve differences in interpretation of observation. • Provide examples of how technological problems create a demand for new scientific knowledge and how new technologies make it possible for scientists to extend their research in new ways or to undertake entirely new lines of research and postulate the effect of a new technology on science. • Provide compelling examples of scientific knowledge that built on previous information and show how multiple theories evolved over time as new evidence developed. • Investigate and summarize, using multiple sources, actual case studies in which scientists were charged with violating ethical procedures.
MEETS STANDARD	• Demonstrate to their peers that the scientific way of knowing uses a critique and consensus process (e.g., communicate methods and procedures used in scientific investigations to peers and teachers). • Investigate and explain that public policy impacts the allocation of research monies (e.g., nuclear research, cancer, AIDS research). • Research and explain how a scientific innovation that was originally challenged is now widely accepted (e.g., sun-centered model of the solar system). • Explain, with an appropriate example, that scientists work with others to resolve differences in interpretation of observations. • Provide examples of technological problems that create a demand for new scientific knowledge and new technologies which make it possible for scientists to extend their research in new ways or to undertake entirely new lines. • Provide examples of scientific knowledge that built on previous information and communicate that entire theories are rarely completely discarded in favor of new ones (e.g., the Greek view of the atom vs. the quantum mechanical view. • Provide examples of ethical scientific policies and the reasons for those policies.

Science Performance Level Descriptors
Processes and Skills
Grade: 12 (Standard 18.0 continued)

APPROACHES STANDARD	• Using examples to describe that the scientific way of knowing uses a critique and consensus process. • Explain how public policy impacts the allocation of research monies with some misconceptions. • Research, but explain incompletely, how a scientific concept that was originally challenged is now widely accepted. • State that scientists work with others to resolve differences in interpretation of observations. • State that technological problems create a demand for new scientific knowledge and new technologies make it possible for scientists to extend their research in new ways or to undertake entirely new lines of research, but cannot provide good examples. • Cite examples of scientific knowledge that built on previous information explaining that entire theories are rarely completely discarded in favor of new ones. • State that scientists have ethical procedures, violations of which have consequences, but are unable to describe specific examples.
BELOW STANDARD	• Describe that the scientific way of knowing uses a critique and consensus process. • Cannot explain how public policy impacts the allocation of research monies. • Research, but cannot adequately describe how a scientific concept that was originally challenged is now widely accepted. • Cannot explain why scientists work with others to resolve differences in interpretation of observations. • Cannot explain how technological problems create a demand for new scientific knowledge and new technologies make it possible for scientists to extend their research in new ways or to undertake entirely new lines of research. • Are unable to provide examples of scientific knowledge that built on previous information. • Are not aware that scientists are expected to follow ethical procedures.

Science Performance Level Descriptors
Processes and Skills
Grade 12

Content Standard 19.0	**Reasoning and Critical Response Skills:** Independently evaluate how the validity of the techniques used affect the credibility of the information obtained in a specific kind of scientific investigation, i.e., controlled experiment, field work or secondary research.
EXCEEDS STANDARD	• Independently evaluate how the validity of the techniques used affect the credibility of the information obtained in a specific kind of scientific investigation. • Develop and present a comprehensive, insightful analysis of costs, benefits and risks, including probable long and short-term effects, in a decision-making situation. • Analyze three systems (one each from life, physical and earth/space science) which are qualitatively different from the components that comprise them and explain, using appropriate graphics, how the individual components interact with the system as a whole. • Distinguish among scientific laws, theories, rules and hypotheses by explaining in detail how these concepts apply to three different contexts: life, physical and earth/space science. • Describe the limits of generalizations, assumptions, analogies and models in general terms and apply the limits to specific instances in two different contexts.
MEETS STANDARD	• Evaluate how the validity of the techniques (e.g., sampling procedures) used affect the credibility of the information obtained in a specific kind of scientific investigation such as controlled experiment, field work or secondary research. • Develop and present an analysis of costs, benefits and risks that includes all major factors in a decision-making situation (e.g., creating a man-made lake to enhance a new subdivision). • Identify and accurately describe examples of systems which are quantitatively different from the components which comprise them (e.g., how populations differ from individuals, how a cardiac system differs from its individual cells; how the features of a carburetor are unique to it yet it functions in an engine system; a raindrop's role in the water cycle). • Compare and contrast a scientific law, theory, rule and hypothesis~~.~~ Explain the limits of generalizations, assumptions, analogies and models by relating and applying each term to a specific concept in science.
APPROACHES STANDARD	• Identify common techniques used to gather information in different kinds of investigations, but are unable to discern how the application of these techniques can affect the quality of the information gathered. • Develop a simplified analysis of costs, benefits, and risks in a decision-making situation. • Attempt to describe situations in which a system is qualitatively different from the parts which comprise it, but the description is incomplete or inaccurate. • Have difficulty in identifying the essential features of generalizations, assumptions, analogies and models and therefore cannot explain their limits.

Science Performance Level Descriptors
Processes and Skills
Grade: 12 (Standard 19.0 continued)

BELOW STANDARD	• Are unable to describe differences in common techniques to gather information. • Are unable to develop an analysis of costs, benefits, and risks in a decision making process. • Have difficulty in understanding that a given system may be qualitatively different from the parts that comprise it. • Cannot explain that hypothesis are based on past experiences, logical thinking and reasonable assumptions. • Are unable to identify the essential features of generalizations, assumptions, analogies and models.

Science Performance Level Descriptors
Processes and Skills
Grade 12

Content Standard 20.0	**Systems, models, risk and predictions:** Students understand that a variety of models can be used to describe or predict things and events.
EXCEEDS STANDARDS	• Match appropriate mathematical symbols and formulas to the corresponding situations confidently and accurately. • Use a computer model to simulate the effects of applying complex rules or of changing the rules; evaluate the usefulness of the model by comparing the results to actual observations of nature. • Identify and describe how systems are often different from their components using multiple examples. • Accurately compare groups of data, taking into account percentages and actual numbers and explain why both are necessary and apply these comparisons to any appropriate situation. • Analyze different types of hazards and using specific examples: • concisely estimate the impacts of hazards • estimate consequences of exposure to a hazard • give fully developed recommendations of ways of reducing or eliminating hazards.
MEETS STANDARD	• Use mathematical symbols and formulas to express (e.g., universal gas law, Newton's Laws of Motion). • Use models to identify and predict cause and effect relationships (e.g., effect of temperature on gas volume, effect of carbon dioxide level on the greenhouse effect). • Can identify and describe how systems are often different from their components using an example (e.g. aquaria or automobiles). • Compare groups of data, taking into account both percentages and actual numbers. • Identify types of hazards (e.g. chemical transportation on highways or railways, earthquakes, drought). Choose one example and: • estimate impacts (fire, explosion) • estimate consequences of exposure to a hazard (illness, death, economic loss of property, loss of livelihood. • provide examples of ways of reducing or eliminating risks (laws, planning and zoning, safety precautions.

Science Performance Level Descriptors
Processes and Skills
Grade: 12 (Standard 20.0 continued)

APPROACHES STANDARD	• Given mathematical symbols and formulas use to express a relationship calculate an answer.
	• Experience limited success in using models to identify and predict cause and effect relationships.
	• Identify inconsistently and describe how systems are often different from their components.
	• Have difficulty comparing groups of data, taking into account both percentages and actual numbers.
	• Are sometimes able to identify types of hazards (e.g. chemical transportation on highways or railways, earthquakes, drought).
	• Inconsistently estimate impacts and consequences of hazards by:
	  • attempting to estimate consequences of exposure to a hazard
	  • providing unclear examples of ways of reducing or eliminating hazards.

BELOW STANDARD	• Use mathematical symbols and formulas to express relationships that behave in the same way as the objects or processes under investigation with inconsistent results (e.g., identify key mathematical relationships derived from models, but have little or no success in applying them).
	• Fail to grasp the underlying concept of using models to predict actual changes in the real world.
	• Cannot identify or describe how systems are often different from their components (e.g., aquaria or automobiles).
	• Are unable to compare groups of data, taking into account both percentages and actual numbers.
	• Can identify types of hazards and have little success in estimating impacts of consequences but:
	  • partially estimate impacts of hazards
	  • have little success in estimating consequences of exposure to hazards
	  • provide few examples of ways of reducing of eliminating hazards.

Science Performance Level Descriptors
Processes and Skills
Grade 12

Content Standard 21.0	Scientific Values and Attitudes: **Students understand that science is an active process of systematically examining the natural world.**
EXCEEDS STANDARD	• Demonstrate, through written and oral work, curiosity, honesty, and the ability to withhold judgment, consistently. • Repeat experimentation for statistical analysis to produce conclusions that are well-supported and without bias. • Propose and evaluate the worth of competing explanations for the same evidence.
MEETS STANDARD	• Clearly demonstrate, through written or oral work, curiosity, honesty, and skepticism (e.g., asking questions, not changing data, reasonably accounting for discrepant data, critically evaluating false or controversial findings). • Repeat experimentation for statistical analysis to produce conclusions that are well-supported. • Given a common phenomenon, generate multiple explanations and describe which explanation is the most logical.
APPROACHES STANDARD	• Demonstrate, on occasion, curiosity, honesty, and skepticism in written or oral work. • Inconsistently repeat experimentation for statistical analysis to produce well-supported conclusions. • Offer a single explanation for the same evidence.
BELOW STANDARD	• Demonstrate sporadically, curiosity, honesty, and/or skepticism in their written or oral work. • Omit repetition of experimentation. • Are unable to generate an explanation for evidence.

Science Performance Level Descriptors
Communication Skills
Grade 12

Content Standard 22.0	Communication Skills: Students understand that a variety of communication methods can be used to share scientific information.
EXCEEDS STANDARD	• Analyze experimental procedures skillfully and suggest appropriate revisions to improve the effectiveness or efficiency of the procedures. • Use tables, charts, and graphs to great advantage in making arguments and claims in oral and written presentations. • Discuss scientific topics in a thorough, insightful manner by restating or summarizing accurately what others have said, asking for clarification or elaboration, expressing alternative positions succinctly, and making use of print, Internet, and multi -media resources.
MEETS STANDARD	• Analyze experimental procedures and suggest appropriate revisions for improvement. • Incorporate the use of tables, charts, and graphs to effectively make arguments and claims in oral and written presentations. • Discuss scientific topics by restating or summarizing accurately what others have said, asking for clarification or elaboration, expressing alternative positions, and making use of available print, Internet, and multi- media resources.
APPROACHES STANDARD	• Occasionally misinterpret experimental procedures and/or suggest inappropriate revisions for improvement. • Use tables, charts, and graphs in making arguments and claims in oral and written presentations but in ways that do not add to the effectiveness of the presentations. • Have limited success in discussing scientific topics due to difficulty in restating or summarizing what others have said, expressing alternative positions and/or making use of available print, Internet, and multi -media resources.
BELOW STANDARD	• Have little success in analyzing experimental procedures and in suggesting appropriate revisions for improvement. • Use tables, charts, and graphs incoherently in making arguments and claims in oral and written presentations. • Discuss scientific topics in such a way that misinformation and/or confusion usually result.

Science Performance Level Descriptors
Processes and Skills
Grade 12

Content Standard 23.0	Scientific Applications of Mathematics: **Students understand that scientific inquiry is enhanced and often communicated by using mathematics.**
EXCEEDS STANDARD	• Determine what the relationships are between variables in an investigation and express these relationships as equations. • Select and use an algebraic relationship appropriate to a problem and arrive at an accurate solution. • Give accurate answers to assigned problems with the correct order of magnitude. • Explain the differences among and be able to use derived quantities, ratios, proportions, and constants to solve appropriate problems. • Provide a thorough explanation or analysis of why a calculation does not agree with the expected result and correct the procedure to obtain an accurate result. • Can select samples by several different random systems to avoid bias.
MEETS STANDARD	• Determine the relationship between variables in an investigation (e.g., direct, inverse, square). • Use a "pre-selected" algebraic relationship to calculate the answer to a problem (e.g., given density = mass/volume, calculate one of the three variables given the values of the other two). • Be able to identify what the correct order of magnitude would be for an answer to a specific problem. • Can use derived quantities, ratios, proportions, and constants to solve appropriate problems. • Provide an explanation or analysis of why a calculation does not agree with the expected result (e.g., the calculation of percent accuracy and class precision). • Can select samples by a random system to avoid bias.
APPROACHES STANDARD	• Misinterpret the relationship between variables in an investigation. • Attempt to use algebraic equations when appropriate. • Inconsistently able to identify the correct order of magnitude for an answer to a specific problem. • Can generally use ratios, proportions, and constants. • Need prompting in providing a reasonable explanation or analysis of why a calculation does not agree with the expected result. • Given a random system, can select an unbiased sample.

Science Performance Level Descriptors
Processes and Skills
Grade: 12 (Standard 23.0 continued)

BELOW STANDARD	• Have little success in determining the relationship between variables in an investigation. • Use few algebraic equations; often use inappropriate application. • Cannot identify the correct order of magnitude for an answer to a problem. • Use ratios, proportions, and constants, with little success. • Cannot provide an explanation or analysis of why a calculation does not agree with the expected result. • Cannot select an unbiased sample using any system.

Science Performance Level Descriptors
Processes and Skills
Grade 12

Content Standard 24.0	Laboratory Skills and Safety: **Students can appropriately and safely apply the tools and techniques of scientific inquiry.**
EXCEEDS STANDARD	• Consistently demonstrate personal responsibility for using safety equipment, observe all safety standards, and assist others to do so. • Follow the information found in materials safety data sheets on proper handling, storage, and disposal of chemicals. • Inspect, manipulate, and teach others the functions of various parts of technical and scientific equipment. • Maintain a comprehensive, permanent record of procedures, data analyses, decisions, error analyses, and conclusions drawn from scientific investigations and recommendations for further study. • Write clear and concise procedures for the investigation of delegated or original scientific problems that are readily comprehended by others. • Independently design, carry out, and write a report on a scientific investigation.
MEETS STANDARD	• Consistently demonstrate personal responsibility for using safety equipment and observing all safety standards. • Consistently follow the instructions given by the teacher on the proper handling, storage, and disposal of chemicals. • Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment. • Maintain a satisfactory record of procedures, data analyses, decisions, and conclusions drawn from scientific investigations. • Write procedures for the investigation of delegated or original scientific problems that are comprehensible. • Design, carry out, and report on a scientific investigation.
APPROACHES STANDARD	• Inconsistently demonstrate personal responsibility for using safety equipment and observing all safety standards. • Require constant reminders to adhere to established standards given by the teacher on the proper handling, storage, and disposal of chemicals. • Inspect, manipulate, and describe, with some errors, the functions of various parts of technical and scientific equipment. • Maintain a somewhat sketchy record of procedures, data analyses, decisions, and conclusions drawn from scientific investigations. • Write procedures for the investigation of delegated or original scientific problems that lack adequate precision and/or detail. • Design, carry out, and report on a scientific investigation with considerable teacher assistance.

Science Performance Level Descriptors
Processes and Skills
Grade: 12 (Standard 24.0 continued)

BELOW STANDARD	• Do not demonstrate personal responsibility for using safety equipment and observing all safety standards. • Require constant supervision in order to prevent injury to self or others while handling , storing and disposing of chemicals properly. • Inspect, manipulate, and describe, with substantive errors or misconceptions, the functions of various parts of technical and scientific equipment. • Do not maintain a permanent record of procedures, data analyses, decisions, and conclusions drawn from scientific investigations. • Write procedures for the investigations of delegated or original scientific problems that are incomprehensible. • Fail to design, carry out, and report on a scientific investigation.

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